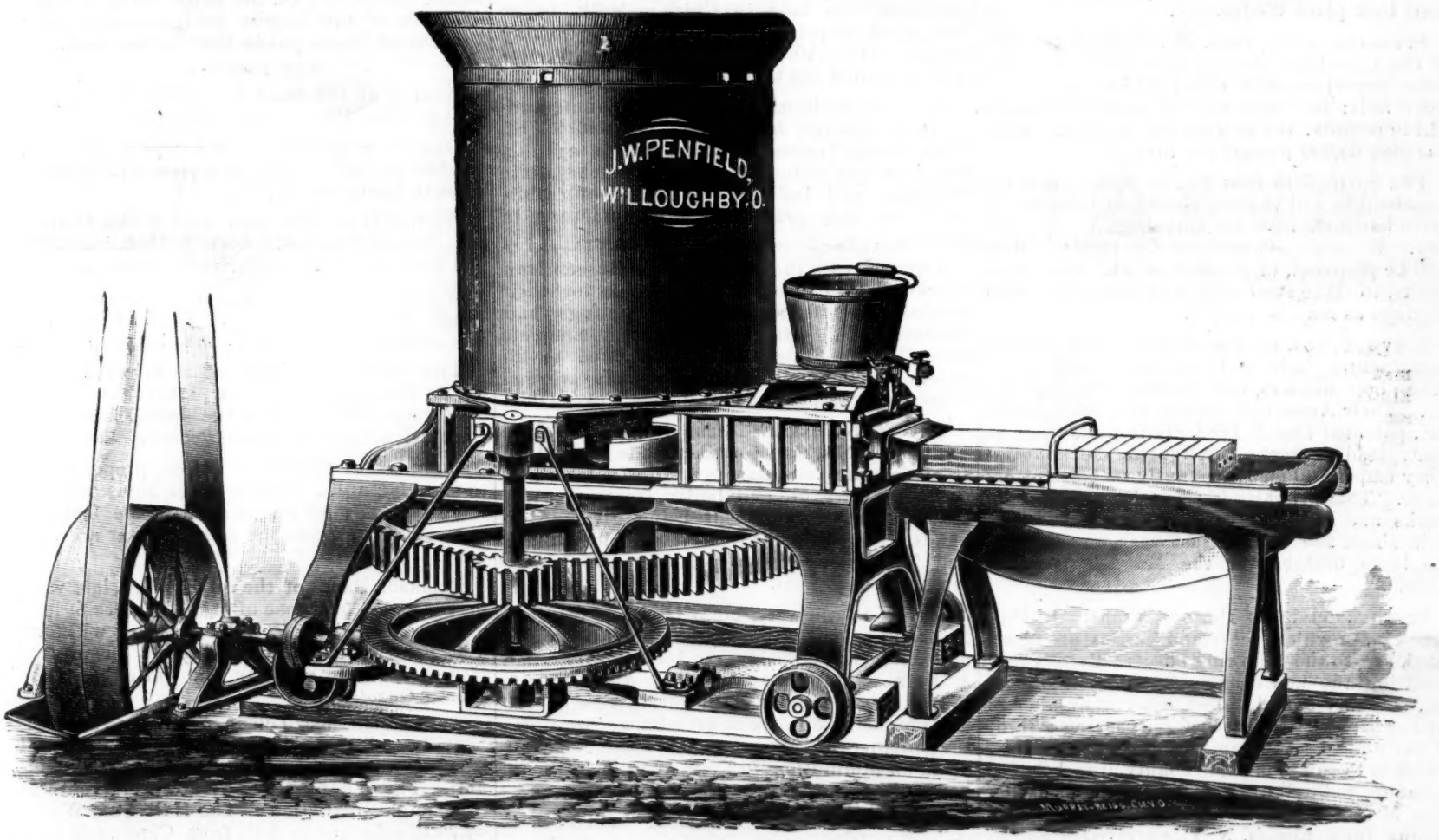
THE TRADE REVIEW
AND WESTERN MACHINIST.

Vol. XVI.—No. 4. CLEVELAND, JANUARY 27, 1883. Whole No. 781

New Machinery.

The Penfield Brick Machine.

What can be accomplished by intelligent study coupled with practical experience is shown by the perfection to which the Penfield Brick Machine has been brought. With a determination to lead in machinery of this kind, Mr. J. W. Penfield, of Willoughby, O., has from time to time added all of the improvements of demonstrated value, until he has secured a brick machine second to none—of such a high order of merit, indeed, that at numerous industrial exhibitions it has carried off the well-merited first premium. For economy, power, rapidity of action, its capacity to deal with various descriptions of clays, and the character of the product it has no peer. It is especially adapted to the stronger varieties of brick clay, including fire clay. The capacity of the machine is about 40,000 brick per day, with a 15 or 20-horse power engine. A number of the most extensive brick manufacturers of the country have adopted this machine and give it the highest commendation. An important advantage attending its use is that the brick are hacked directly from the machine, thus saving the hazardous and expensive dry-yard process. The cut herewith given presents a fair idea of the peculiarities of the machine, which merits the careful attention of brick-makers.



THE PENFIELD BRICK MACHINE.

The practical machinists of Cleveland will find the columns of the TRADE REVIEW AND WESTERN MACHINIST always open for their contributions. Younger journeymen will find the practice of writing one that will greatly assist them in performing intelligent work and securing steady advancement in their calling. The experiences of practical men are always more valuable than mere theories, even though clothed in the homely language of every-day life. In fact, they are all the better for that.

THE LARGEST ORE OUTPUT YET.

Product of the Lake Superior Iron Mines and Furnaces.

[Marquette Mining Journal.]

The following table exhibits the output of the Lake Superior iron mines in 1882, together with the approximate value of the same in the market:

Name of Mine.	Gross Tons.	Value in Market.
Argyle	12,321	$ 117,999
Barnum	41,778	396,891
Bay State	1,236	7,416
Beaufort	5,532	30,426
Bessemer	27,491	161,964
Boston	18,245	178,327
Brier Hill	10,593	90,041
Cambria	47,545	85,270
Champion	159,009	1,590,090
Chapin	247,506	2,103,810
Cleveland	206,120	1,958,140
Commonwealth	115,862	752,503
Calumet	5,847	49,700
Crystal Falls	1,341	8,716
Curry	13,874	114,779
New Burt	5,017	47,661
Norway	166,373	1,091,374
Quinnesec	44,240	331,800
Paint River	6,515	35,842
Pendill	4,178	22,979
Perkins	73,648	626,008
Pittsburgh and Lake Superior	41,456	373,104
Republic	235,100	2,351,109
Rolling Mill	163	896
Saginaw	11,259	106,960
Salisbury	41,243	247,458
Section 12	3,287	17,078
Spurr	8,873	78,857
St. Lawrence	9,988	49,940
Swanzey	31,498	188,988
Sterling	8,006	76,057
Taylor	15,146	83,303
Titan	1,778	9,779
Union	15,948	103,662
Vulcan	94,942	799,357
Webster	4,443	24,436
West Republic	27,865	264,717
Wheat	9,554	76,432
Wetmore	1,777	9,773
Wick	196	1,078
Winthrop	23,005	138,030
Youngstown	6,198	37,188
Scattering	719	3,953
Total iron ore	2,943,314	$24,237,166
QUARTZ.		
Carp River Iron Co	5,595	27,975
Powell Bros & Co	1,644	8,215
McVichie & Co	5,385	26,925
Total quartz	12,623	$ 63,115
Total ore and quartz	2,955,937	$24,300,281

Coal Consumed In Iron Manufacture.

As many wild statements are current in regard to the quantity of coal consumed in the manufacture of iron, it may be worth while to notice that the census, in enumerating the kinds and quantities of fuel used, includes 3,622,498 tons of anthracite and 5,659,055 tons of bituminous coal, 2,277,555 tons of coke, and 69,592,091 bushels of charcoal. Stoppage of iron works at the West or South does not affect the producers or carriers of anthracite coal materially, but stoppage of such works at the East would be a serious matter.

The Norwalk organ factory will double its capacity. Its monthly output will be from 400 to 500 organs.

Manufactures.

OHIO INDUSTRIES.

CLEVELAND.

WE call especial attention to the ad. of Whitney & Raymond's United States organs, in this week's issue.

THE Joy Steam Heating Co., of Titusville, Pa., have opened an office in this city, at No. 70 Frankfort street.

THE Garry Iron Roofing Co. have just occupied their fine new works and office, corner of British and Merwin streets.

TAYLOR & BOGGIS, iron founders, 65 to 73 Central Way, employ 275 hands and carry on two large foundries. Trade is reported good.

IN the line of stave machinery, pulleys, hangers, shafting, etc., John S. Oram, 155 and 157 River street, reports all the orders he can fill. He ships principally to the West and has been in the business eight years.

H. L. & E. A. SCHWARZENBERG, 53, 55 and 57 Merwin street, dealers in scrap iron, steel and metals, are both young and enterprising business men. They opened up their present store in October last and are doing well, though trade is somewhat dull at present.

THE Cleveland Rolling Mill Co.'s steel works and nail mill started up Tuesday morning, but did not run long before the crown valve of the boiler in the old mill burst, and all the mills had to shut down in consequence. A fresh start took place Wednesday.

SPEAKING of big runs, Mr. William Garrett, of the Cleveland Rolling Mill Co., in one day (nine hours) recently rolled 73,500 pounds of No. 6 rods; the night turn of nine hours made 72,140 pounds; the average for the week's work was over 65,000 pounds per turn of nine hours.

THE Springfield Iron Co., of Springfield, Ill. are about to add to their plant two large steam helve hammers from the Cuyahoga Works, this city. When these hammers are in place they will be prepared, in connection with their steel works, to make steel axles and such other steel forgings as may be wanted.

REEVE & SON, of the Novelty Iron Works, manufacture bolt and nut machinery of all kinds, bolt headers, bolt pointers, nut tappers, etc. Their Acme bolt cutters and nut tappers, etc., patented Dec. 5, 1882, are in use at a great many leading works throughout the country. They employ 30 men constantly on bolt cutters alone. This firm also have a frog and crossing works and a bridge works in Cleveland, and built about 200 bridges last year, among them the large bridge over the Maumee river, at Toledo.

FURTHER details of the new Transit Oil Pipe Line Co., in which Cleveland parties are interested, are to the following effect: Parties representing the new company were at Lebanon, Pa., January 5, and called upon a number of land owners with the view of purchasing a right of way and to settle damages for their pipe line, which is to run along the county line between Lebanon, Schuylkill, and Berks. Information from Mifflin states that a corps of civil engineers hailing from Elmira, N. Y., surveyed a line to locate the pipe line, running from Trevorton to Reading, which will pass through the Lebanon valley. It is expected to lay the pipe from 18 to 24 inches under the ground, so as not to interfere with the tilling of the soil. The parties paid 25 cents per rod.

OHIO IN GENERAL.

FIRE damaged the Toledo Bending Works $3,000 last week.

THE Steubenville Clay Pot Co. are getting into shape to start up as rapidly as possible.

THE Fowler Boiler Manufacturing Co., of Newark, has been closed by the sheriff.

CINCINNATI stove foundries are idle pending action on reducing wages of molders 15 per cent.

TRADE has never been better with Hepburn Bros., proprietors of the Union Boat Works, Toledo, than this season. They have been in the business five years.

DEMING & ROLLEN have bought of H. Leonard for $12,000 the New Era Mills (flouring), at Oberlin.

THE product of the lumber mills of George Massetter & Co., of Portsmouth, is fifteen million feet per year.

THE Burton (Geauga county) Manufacturing Co. has purchased the right for the United States for the Crosby patent sled.

THE Cuyahoga Forge and Iron Co., Cuyahoga Falls, have a large contract for iron from the Oil Well Supply Co., of Oil City.

THE U. S. Machinery Co. have put $5,000 worth of lathes, drills, etc., in the chain works, Cuyahoga Falls, lately occupied by the Wheeler Iron Co., and will make a specialty of bolt-heading, rivet-making and upsetting machines.

ALTHOUGH they are now running 300 hands, the Union Manufacturing Co., Toledo, inform the TRADE REVIEW that they will soon put on an extra force of 100 more to meet the increasing demands for their products of woodenware.

BY the breaking of a bolt in the piston head of the engine of Mr. E. A. Osborn, Hudson, last Thursday, the cylinder head was knocked to pieces and the frame so damaged that Mr. O. had to come to Cleveland for an entire new engine.

AKRON, Canton and Springfield establishments were represented at a meeting of harvest manufacturers held in Chicago week before last, at which prices were fixed for the coming season. Over 100,000 self-binding harvesters will be turned out this year.

SINCE M. H. Bartley started the manufacture of saws, springs, hay knives, etc., at 92 St. Clair street, Toledo, eighteen months ago, his business has extended until it reaches into Michigan and Indiana and throughout Ohio. He is the only practical saw manufacturer in Toledo.

TWENTY years run has given the Russell Iron Works, Toledo, an enviable prestige for their specialties—pulleys, hangers, couplings and shaftings—and with one of the most complete shops in the State they are prepared to fill orders on short notice. Thirty hands are employed, and shipments are made all over Ohio.

THE TRADE REVIEW learns from the Toledo Foundry & Machine Co. that trade is good in steam engines, circular saw mills, potash kettles, grate bars, fire and boiler fronts, gearing, etc., constant employment being given to 35 hands. Shipments extend into Ohio, Indiana and Michigan, and prospects for the coming season are excellent.

OWING to the very large increase in their force and output last year, in anticipation of an unusually heavy business in 1883, the Whitman & Barnes Manufacturing Co., Akron Knife Works, have found it desirable, in view of the less promising outlook at present, to cut down the number of their hands. This does not mean an diminution in their regular business, however.

THE only wire establishment in Toledo is that of F. Powell & Co., who, though having a rather dull trade in the winter months, anticipate a lively spring trade. Their descriptive catalogue shows a host of attractive articles, embracing flower stands, counter railings, signs, stove fronts, grave fences and arches, moss baskets, spark guards, nursery fenders, window screens, settes, fences, etc.

THE busy season is now upon the Gendron Iron Wheel Co., Toledo, and a TRADE REVIEW representative was informed that their expectations for the coming season exceed even the heavy business done the past year. Their force of 35 hands will shortly be augmented to fill orders which are now rapidly coming in. They also make baby carriages, velocipedes, bicycles, wheelbarrows, express wagons, etc.

AN establishment which the TRADE REVIEW expects to refer to again in the way of an illustrated article is that of the Toledo Car Heater Co., sole proprietors and manufacturers of the Root Patent Street Car Heater. They have been manufacturing these heaters for the past two years, having furnished them to the street railroad lines in Pittsburgh, Toledo, Rochester, Brooklyn, Albany, New York, Baltimore, St. Paul, Minneapolis, and several other cities. It is to be hoped that Cleveland may soon be added to the list.

LIMA is one of the numerous flourishing industrial points in Ohio. It has extensive car shops, iron foundries and machine shops. The Lima Car Company has a capital of $250,000. The works of the Lima Iron Fence Company cover three acres. The main shop is 50x200 feet and the engine-room 30x40. A 30-horse-power engine is used. A foundry 60x80 will be built in the spring. The capital stock of the company is $100,000. They manufacture forty styles of iron fence. The Irvin Wheel Company turn out $100,000 worth of goods annually.

FROM the Youngstown *News-Register* we condense the following: Every rolling mill in the city is running double turn in all departments.——$70,000 paid to workmen last Saturday.——Girard furnace is making 95 tons of mill iron a day.——Booth, Miller & Co. expect to produce more rolls in 1883 than ever before.——One of the furnaces of the Sharon Iron Co. will be raised 22 feet. It is now 48 feet.——The first heat in the new melting furnace of the Malleable Iron Co. was run last Saturday in one hour and 40 minutes.——The Morse Bridge Co. has just secured the contract for placing an iron bridge across the Scioto river, on State street, Columbus, O., the price being $16,400. Thirteen of the largest bridge companies in the United States put in bids for the work.

NEW PROJECTS.

NEARLY all the stock for building a tin plate mill at Hubbard has been subscribed.

DAYTON is organizing a company with $1,000,000 capital to carry on a slate mining enterprise in Craig county, Va.

HUSTON HAYS' iron and steel works, Coshocton, burned Tuesday. Loss, $80,000, less $15,000 insurance. Incendiarism is suspected.

WARREN is to have a new industry in the shape of a glove factory. A. H. Ingersoll & Son, of Gloversville, N. Y., are the proprietors.

THE report in circulation that Brown, Bonnell & Co., Youngstown, contemplated building an additional rolling mill in the spring is without foundation, says the *News-Register*.

THE Stevens Filter Co., Toledo, propose soon to manufacture a cheaper filter, so as to reach the masses. They report a fair trade last season. The prospects the coming year are very good.

ROBINSON BROS., of the Sixth Ward, last week perfected the purchase of some 27 acres of land on Spicer street on Wolf Run. They will form a company and proceed to erect one of the largest fine ware shops in the United States.—*Akron Gazette.*

AKRON, Alliance, Toledo, Youngstown, Steubenville and several back counties not yet heard from are all after the Hall Safe Works, Cincinnati. The TRADE REVIEW, however, ventures this simple prediction: The Hall Safe Works will still continue to hail from Cincinnati long after the present fever has been forgotten.

IT is reported that a consolidation of five of the largest iron companies in the Hocking Valley with two of the largest coal companies into one company and under one management is to take place within a day or two. The Crafts Iron Company, the Thomas Iron works, Winona Iron Company, Bessie Furnace and Akron Iron Company, and the Thomas Coal Company and Longstreet Coal Company will form the new syndicate. General Sam Thomas, Walter Crafts, Colonel Churchill, John R. Buchtel and other prominent men of this mammoth enterprise made a tour of inspection of the various works Tuesday.

NEW incorporations the past week: Gilford Car Coupling Co. of Cincinnati, capital $500,000; American Seed Oil Co. of Cleveland, capital $300,000; The Parker Wise Co., Cincinnati, capital $50,000; Lorain Lumber and Manufacturing Co. of Lorain, O., capital $40,000; Rus-

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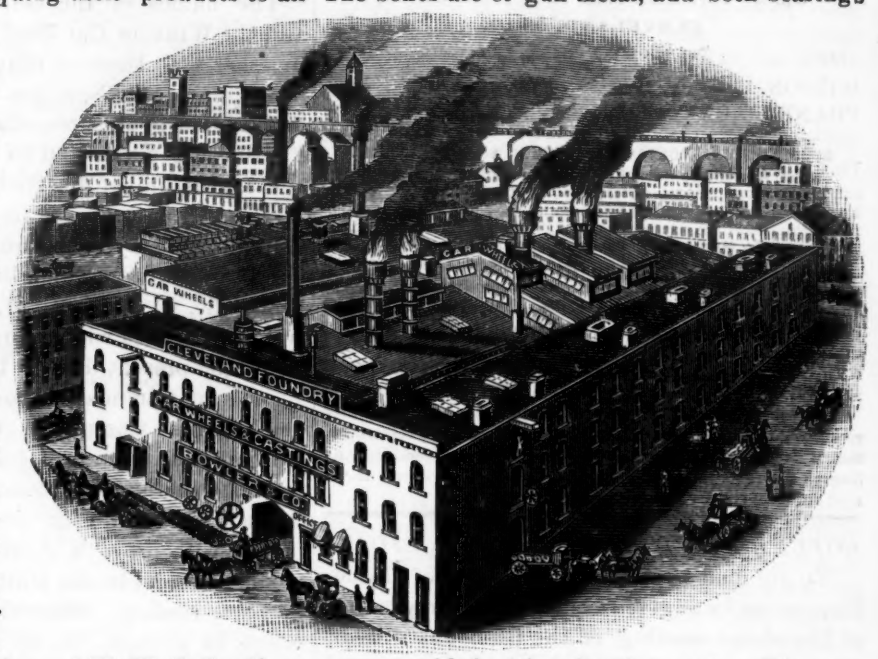
Jeffords' Axes and Edge Tools.

The name of C. L. Jeffords has long been associated with the manufacture of the best axes and edge tools made in this country. Starting in 1834, at Jamestown, N. Y., Mr. Jeffards has, by the pure merit of his articles, pushed them into the market until his trade is not confined even to the limits of the Union, but extends to the Old World. As an evidence of the enviable reputation enjoyed by his goods, it may be stated that he is now filling an order of 500 dozen axes, with helves, for Australian parties. His patterns of axes range all the way from the Jeffords axe, 36-inch handle, to the boy's axe, 19-inch handle. He also makes doubled-bitted axes, broadaxes, railroad adzes, picks, mattocks, etc. Among his specialties we may mention the Jeffords combined machine for forming overall steel for axe bits and punching pick polls. This machine works automatically—requiring but a single workman to feed in the heated steel bar. It makes 20 cuts per minute, or 12,000 in ten hours; but as one-half or more motions will necessarily be lost in changing the bar from the furnace to the machine, its actual rating would be about 5,000 per day. Of Mr. Jeffords' other inventions, his axe polls deserve notice. They are run by eccentric gears, and when the work is done the power so increases that it does not require more than one-third of the power of any other rolls. They do all the work, make the pattern, fold it, squeeze the head, and trims it after it is welded, ready for the steel. It does not require skilled labor to work them, and they are easily adjusted to the different sized axes. Two men can make polls with them with good results as more; they will cut the iron and make 500 polls in ten hours. Four men will make from 1,000 to 1,200 in the same time; and where power is an object, (as it is in many cases,) they are of great advantage; and one of the best evidences of their merit, is that all the parties that have put in rolls since their introduction, have, on trial, adopted them. Still another of Mr. Jeffords' specialties is the cast-steel patent perforated wedge and labor-saving tool. As labor is one of the most essential elements that enter into our productions, any improvement in a tool or a machine to relieve it is of great value, and the perforated wedge for splitting wood, and any other use it may be adapted to, is one of the great labor-saving tools, as a pound wedge is equal to a nine-pound wedge, old style; the force of the blow has less resistance to overcome; and a blow with the maul will force the wedge twice as far into the timber. Consequently half of the muscle is saved, and there is the great advantage, and any one after using one of them, would not part with it for five times the cost of it. This is one of the solid firms of Jamestown, which is noted for its solid firms.

One of Cleveland's Most Solid Institutions.

No one can look down on "the flats" from the sightly outlook of the Viaduct, without having his eye caught by the massive buildings of Bowler & Co.'s Cleveland Foundry, on Winter street. Since 1863, this enterprising firm have been carrying on a general foundry business in this city, year by year extending their trade and increasing their facilities until now they employ upwards of 100 hands, manufacturing chilled-face railroad frogs, all kinds of machinery and rolling mill castings, sending their products to all parts of the country.



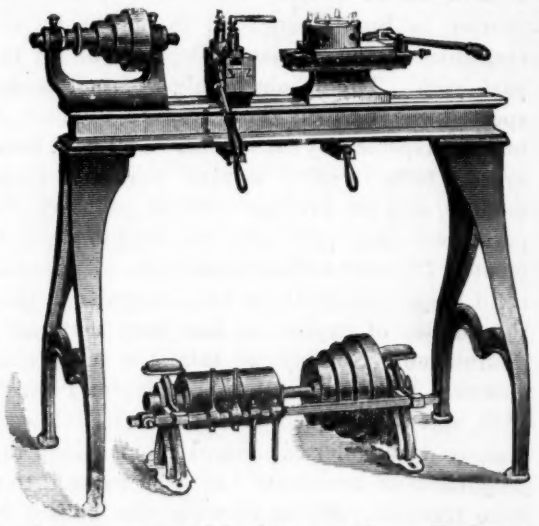
The car-wheel department is running full on orders from their regular railroad customers from some ten or twelve different States, taking 120 wheels daily. The machine shop is separate from the foundry, supplied with all the necessary tools for fitting wheels and axles. They give particular attention to supplying street railroads with everything pertaining to track or cars. The indications are favorable for a large trade in 1883. The gentlemanly members of the firm, Messrs. N. P. and William Bowler and W. W. Balkwill, are all practical men, thoroughly posted in every department of the foundry business, and their work uniformly bears witness to their intelligent personal supervision and the painstaking care of their workmen.

A BILL has been introduced into the Florida Legislature to incorporate "The Florida Ship Canal Co.," capital, $60,000,000. The plan contemplates the digging of a ship canal from the Atlantic to the Gulf across the peninsula from the St. Johns river to the Suwanee river above the town of Cedar Key.

THE REVIEW takes pride in its advertisers. They are among the solid men of the country.

New Turret Lathe.

The engraving which accompanies this, represents a 13½ inch swing turret lathe, especially designed for the use of manufacturers of light brass work, such as telegraph and electric instruments, valves, lubricators, etc., and also for other than brass work, where several tools are used and quick handling is desirable. It is fitted with a hollow tapered spindle, the hole in which 17-32 inch in diameter. The front bearing is 1½ inches diameter and 2⅜ inches in length. The boxes are of gun metal, and both bearings are provided with adjusting nuts. The cone has four changes for 1½ inch belt. The turret is 6″ diameter, and is fitted for six tools, and has a stroke of 5″. The cut-off slide has two



tool posts operated by lever motion. Both cut-off slide and turret have stop motion. The counter shaft has forward and back motion. This machine is manufactured by James Aitchison, 52 Canal street, city, who started in the machine business about two years ago, and is now furnishing employment to a number of good mechanics. Orders from such well known firms as Hill, Clark & Co., Boston, and E. P. Bullard, New York, speak well for his success. The third order from Schneider & Trenkamp, of this city, is a rather flattering testimonial in regard to the success of his special turret lathe. He has under construction two larger sizes, also 4 large Duplex steam air pumps, just about completed for National Gas Co.

THE fire losses in the United States during 1882 amounted to $70,000,000, half of which fell on insurance companies. Eighteen fire companies have ceased business because it is profitless.

THE use of steel in ship building appears to be steadily growing in favor, alike with the bilders and owners. In 1879, according to a statement in the London *Times*, the tonnage of steel-built vessels amounted to only 18,000, in 1880, it rose to 42,000 tons, and in 1881 to 66,609 tons. In 1882 the steel vessels built on the Clyde numbered 60, with an aggregate tonnage of 108,254 tons.

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To Machinists, Manufacturers and Others.

THE publishers of the TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinists and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised before sending to press.

BOILERS AND BOILER EXPLOSIONS.

We are glad to see that the subject of "Boiler Explosions" was given a place in the programme of the recent meeting of the Ohio Institute of Mining Engineers. This is a matter of vital importance not only to all steam users but to the public in general. That intelligent inspection of steam boilers, under Government authority, is highly beneficial is shown by the statistics of the Treasury Department for the past year. The whole number of boilers inspected was 61,708. The average number of boilers inspected by each officer was 1,667; their average term in office is nine years and three months, and the average number of years' experience in their profession previous to appointment is 23 years and seven months. Under the rigid inspection of these experienced officials, the number of explosions has been materially diminished. Notably is this the case with steamers running on Western rivers: Prior to 1849, among the 1,656 river steamers, 168 were destroyed by boiler explosions alone. Now the proportion of accidents has been reduced to a mere fraction. While, however, the hazard of river travel has been so greatly decreased, that growing out of the rapidly increasing use of stationary and portable engines shows still an alarming extent. Among the causes which lead to explosions, as enumerated by the *Locomotive*, are: Leakages at the girth seams and around the tubes of externally-fired horizontal tubular boilers; overheating through shortness of water; feeding cold water into the boiler and delivering it close to the hot plates over the fire; shaking the seams by pulling the furnace doors wide open, without closing the chimney damper, and blowing a boiler off and immediately refilling it with cold water, while the brick-work is red hot. Experienced engineers will recognize in all these fruitful causes of damage, and frequently destruction, of boilers. To better protect the public against these dangers, the idea has been suggested of a National law fixing the "life" of a boiler, say five, ten, fifteen or twenty years. We quite agree with the *American Engineer* that this is going at the question in the wrong way. "It not infrequently happens," says that paper, "that new boilers are turned out from shops which are entirely unfit for the purposes they are intended for, while quite as frequently boilers of an age and a use far beyond the limit the reformers of whom we speak would permit boilers to be in use, are doing excellent service and are in best condition, as far as intelligent and skilled engineering ability can detect." How, then, to reach a solution of the problem is still the question. Rigorous and intelligent inspection can do much; is there anything that can do more?

THE TIN-PLATE CONTROVERSY.

The names of the Garry Iron Roofing Co. and the Winslow Car Roofing Co., of Cleveland, together with those of other roofing companies in Ohio and the West, are attached to a protest to Congress against maintaining the old rate of 1 1-10 cents per pound on tin-plates and also against the unjust discrimination in the matter of sheet iron, proposed in the pending bill. This is a many-sided question. On the one hand are the manufacturers of tin-plates at Wellsville, O., McKeesport, Pa., and at one or two other places who are urging further protection. The present duty is 1-10 cents per pound. The Tariff Commission doubled it. The Ways and Means Committee first reduced it to 2 cents and then to 1 1-10 cents, its present figure. Against this reduction the iron roofing companies vigorously protest. They argue that it will prove a disastrous blow to every roofing interest in the United States, excepting tin plate roofing. Meanwhile another voice is raised in protest, but on a very different account. The tin plate importers and those engaged in the manufacture of tin utensils for use in families and for canning purposes, not content even with the proposed duty to 1 1-10 cents, insist that it shall be reduced of one-half cent per pound. The Harford County (Md.) Canners' Association in particular, are exceedingly strenuous on this point. They state that Harford county alone in 1882 packed 38,400,000 cans of hermetically sealed goods, which was the output of 300 factories giving employment to about 16,000 persons. To refuse to reduce the present duty on tin-plates, they argue, will cripple their industry, cut off their exports and increase the burden upon the common people. Without stopping to point out the fallacy of this position, it is sufficient to say that Congress has it in its power to right two wrongs at once, first, by affording tin-plate manufacturers all needed protection, secondly, by equalizing the duty on sheet iron. Tin-plates are now admitted at 6 per cent. less duty than pig iron; 30 per cent. less duty than galvanized iron, and nearly 60 per cent. less duty than common sheet iron. As we understand it, the manufacturers of iron roofing do not ask any special protection, but they do insist, and with justice, that if it should be deemed advisable to continue specific duties on sheet iron, galvanized iron, tin-plates, etc., the rates to be so adjusted as to apply according to the value of the material and cost of labor and production, in other words, "that discriminating duties which favor tin-plate against black sheet-iron be removed."

FUTURE OF OHIO COAL PRODUCTION.

Ohio's coal product in 1881 was 8,225,000 tons. The past year it was over 9,000,000 tons. But one State, Pennsylvania, out-ranks us. Meanwhile our annual production is doubling itself every ten years. What, then, of the future? State Mine Inspector Roy, in his annual report, estimates that at the beginning of the 20th century, now only 17 years distant, the annual coal production of Ohio will be 30,000,000 tons, while our ore output will reach over 2,000,000 tons, employment being given to 70,000 workers. These are astounding figures, but they are demonstrable from the logic of events. During last year alone new mines capable of producing an aggregate of nearly 3,000,000 tons were opened up. Are our coal deposits approaching exhaustion? Mr. Roy thinks not. Nearly one-third of the area of the State, he says, is covered with coal-bearing strata. Enclosed in these coal measures are no less than 40 different beds of coal, ranging from three to twelve feet in thickness, and of every known variety. Incredible as it may seem, we have scarcely yet begun to draw upon our mineral resources. From a comprehensive view of the field, Mr. Roy concludes that, at a very moderate estimate, there can be no less than 85,000,000,000 tons of coal locked up in the coal measures of the State—*an amount capable of supplying the wants of the whole earth, at the present rate of consumption, for the next four hundred years.* It is something, too, to rank second among the States in respect to production, for the United States stands second in the same regard among the nations of the earth. In 1881 the total output of Great Britain, of coals of all varieties, was 154,184,300 tons. Next to her came the United States with an aggregate of 76,184,000 tons, outranking Germany, France, Belgium, Austro-Hungary, Russia, India and Japan, Australasia and Canada, in the order named. In 1882 our country's production rose to 86,259,000 tons, and its increase during the past 13 years has been at the rate of 4,000,000 tons, or over 25 per cent. per annum. Whether we shall retain this position, recede from it or ultimately displace Great Britain remains to be determined; but Ohio's future would seem to be assured, both in the extent and the variety of her product.

A REVISION OF ORE THEORIES.

In a recent review of a pamphlet entitled "The Origin of the Iron Ores of the Marquette District, Lake Superior," by M. E. Wadsworth, Ph. D., of Harvard College, this journal took occasion to refer to his theory regarding the formation of ore deposits as based on their eruptive, rather than sedimentary origin. The importance of this theory in its bearing upon present methods of mining and the prevailing estimate of the value of this territory, is at once apparent. Dr. Wadsworth holds that copper was originally finely disseminated through the lava at the time of its outflow and has since been locally concentrated by percolated waters in the amygules, veins and conglomerate beds. In a later note to the editor of the TRADE REVIEW, Dr. Wadsworth says: "If my views are correct, there need be no fear of reaching the bottom of the deposits of iron ore in Lake Superior; but the methods of exploitation ought to be different if the ores are eruptive than if they are of sedimentary origin. If the former view (eruptive) is correct, the district is worth vastly more than if the ores are sedimentary." Here is material for thought for our ore companies. If it can be shown that the eruptive theory is correct, vast possibilities lie before them. If existing methods of exploitation are wrong, a revision of both theories and practice is in order. During the last 26 years, the total amount of ore and pig iron mined in the Lake Superior regions was 21,501,970 tons, valued at $164,835,895. Last year the value of the product was $26,243,620. What the limit of this district may be is conjectural, but Dr. Wadsworth offers a theory, supported by a large number of facts, which, if found to be correct, will add vastly to the solidity of ore interests.

A YOUNG Cleveland mechanic addresses a note

to the *Mechanical Engineer*, lamenting his inability to become a locomotive engineer, saying that he has tried every road in the city during the past six months for a situation as fireman but without success, and wanting to know the reason. The *Mechanical Engineer* replies that the inquirer is but one of a multitude who are seeking for the same kind of work, and that the best plan is to abandon all attempts to move upon over-petitioned superintendents and master mechanics and cultivate the acquaintance of some influential engineer who by the right word at the right moment may sometime secure for the really deserving applicant a good position. This is sensible advice, and we hope the young man, who is evidently both intelligent and worthy, may have his long-deferred wishes fulfilled at an early day.

THE debate on the Senate tariff bill still progresses. Several test votes on amendments have been taken, but it can hardly be said that they give a clear indication of the ultimate disposition of the bill. An amendment by Mr. Miller, making the duty on iron ore $1 a ton, was lost by the decisive vote of 11 ayes to 37 nays. Even stronger negative votes were given on amendments fixing the rate at 85, 75 and 60 cents respectively. An amendment by Mr. Sherman, fixing the duty on pig iron, spiegeleisen, kentledge, wrought and cast scrap iron and scrap steel of all descriptions at three-tenths of a cent per pound, equal to $6.72 per ton, as recommended by the Tariff Commission, was lost by a vote of 16 to 37. Slight reductions on steel railway bars and other varieties have been made, but the bill still remains in a chaotic state.

THE Akron *Sunday Gazette*, referring to the TRADE REVIEW's recent article in favor of arbitration as a means of settlement of mining strikes, says that that plan has been in operation in the Mahoning and Tuscarawas valleys for ten years or more. Attempts at arbitration have been made at intervals during the past ten years or more, but any really practical trial of the English system remains yet to be made. It is to be hoped that the recent proposition of the operators to arbitrate the difference in price between the Hocking and Tuscarawas valleys may prove the entering wedge for a better order of things.

THE TRADE REVIEW has to enlarge its borders with this issue to accommodate the demands of its patrons. A number of specialties are written up as matters of general interest, and the advertisements will be found to be of equal importance. We call especial attention to our large and representative list of advertisers. They are all thorough-going business men, not the least evidence of it being their appreciation of the TRADE REVIEW as a medium through which to reach the purchasing public.

TWO-CENT postage is coming sooner than expected. The bill has passed Congress, with July 1, 1883, fixed as the date when it is to take effect. Business men and the public generally will appreciate this.

A WOMAN riding on a Pennsylvania railroad on a free pass, was badly injured by a collision, and the company resisted her claim for damages on the ground that by one of the conditions on the ticket, the user assumed all risks. The jury gave her a verdict for $2,000, and the Supreme Court affirmed the decision.

Manufactures.

[Continued from page 4.]

sell & Morgan Printing Co., capital stock $400,000; Cincinnati Transfer Co., capital $1,000,000; King Varnish Co., Akron, capital stock $25,000; South Pennsylvania & Ohio Railway Co., capital stock $50,000; Liquid Soap Co., Logan, capital stock $100,000; Dronillard Flame Co., Cincinnati, capital stock $600,000; Ohio Valley Coal Co. of Cleveland, capital $50,000; Summit Mining Co. of Akron, capital $50,000, and the Cincinnati Target Ball and Trap Manufacturing Co., capital $100,000. Certificates of increase of capital stock were filed by the Newark Machine Co., from $200,000 to $300,000; Leetonia Tool Co., from $20,000 to $30,000; Eckstein White Lead Co., Cincinnati, $500,000 to $1,000,000.

ADJOINING STATES.

NEW Castle, Pa., capitalists propose to build a rolling mill and nail factory at Mercer, Pa., if that town will donate the necessary ground.

THE Seneca Falls Manufacturing Co., Seneca Falls, N. Y., have been in operation three years and enjoy a large home and foreign trade. Twenty-five hands are employed.

BRADLEY & Co., Syracuse, N. Y., appear in our advertising columns this week, in the form of an announcement regarding their famous rubber cushioned helve hammers.

ATTENTION is called to the advertisement of John C. Jewett & Sons, Buffalo, N. Y., in this issue. Their mammoth works occupy three large buildings, and their products are almost beyond enumeration, embracing the celebrated Jewett refrigerators, ice chests, filter and porcelain-lined coolers, toilet ware, bird cages, cuspadores, bathing apparatus, novelties in horse-furnishing goods, etc.

THE new Glass Works of Knox & Foltz, in West New Castle, has been completed and is now in operation. The pots were first set on December 30 and January 1 and 2, and the factory began operations on the 5th, the works giving satisfaction from the start. The establishment is an extensive one, and will add materially to the prosperity of New Castle. It embraces nine buildings.—*New Castle (Pa.) Guardian.*

THE popularity of the new pulsometer steam pump is largely on the increase, both at home and abroad. The Pulsometer Steam Pump Co., N. Y., have just received an order from the Philadelphia & Reading Railroad for 13 of their No. 8 pumps, 5 inch suction, 750 gallons per minute, to be used on their steam colliers for pumping water ballast. They are now working on orders received from South America, Cuba and Mexico for pumps of various sizes.

The Chinese and the Electric Light.

Science still meets with many difficulties in its progress into China, and the electric light is the latest improvement which has excited the suspicion and dislike of the Mandarins. The foreign settlement at Shanghai has for some time been lighted on the Brush system, apparently to the comfort and delight of the denizens of the "model settlement," as the foreign portion of the city is generally called. The promoters appear, however, to have reckoned without the Chinese officials. They probably thought that where gas was permitted, there could be no objection to electricity. The Chinese Governor of the district appears to be of a different opinion. He has addressed a letter to the senior Foreign Consul requesting the removal of all the electric lamps. He has read, he says, in translations from European papers, that terrible accidents have arisen from electricity, and flatly refuses to permit the residents of Shanghai to be exposed to such dreadful risks. Hundreds of thousands of houses might be destroyed, millions of lives might be lost; even the walls of the city might be blown down if anything went wrong with the machines. He has strictly forbidden his own countrymen to use it, and has peremptorily ordered those who have already adopted it to discontinue it forthwith.

General Trade Topics.

FRENCH trade returns for 1882 are unfavorable.

THE Oxford Iron Works, Belvidere, N. J., have resumed.

CLEVELAND oil speculators are talking up an Oil Exchange.

SEVERAL glass firms in New Jersey have acceeded to the demands of the strikers.

THE value of forest products exported from the United States to foreign countries in 1860 amounted to $3,366,455, $4,998,648 in 1880, $9,138,934 in 1881.

BUSINESS failures for the week ending January 19 numbered 277, compared with 262 the previous week. Few are important; many "quit business" at the end of the year.

THE official report of the anthracite coal tonnage for 1882, puts it at 29,120,096. The stock on hand at tide-water shipping points, December 31st, was 562,1116 tons.

IT takes 166,050,000 each year to shoe Uncle Sam's family, which is said to require 30,590,000 pairs of boots and 94,887,000 pairs of shoes; 111,152 people are kept busy supplying this.

THE hauling of logs by rails has developed into an industry in Michigan, within the past ten years. Last year four railroads of that State hauled 279,820,958 logs to terminal points.

FROM November 1 to January 18, according to Cincinnati *Price Current* advices, 4,404,792 hogs have been packed in the West, against 4,544,730 the same date last year. Cleveland reports 48,148 to 80,000 last year.

WHAT promises to become the largest iron furnace in the United States has grown up quietly in the Virginia mountains, and is now nearly ready to be put into blast. It is in Rockbridge county, will produce 200 tons iron daily, and belongs exclusively to English capitalists.

THERE are 1943 establishments in the United States engaged in the manufacture of agricultural implements. The capital invested amounts in round numbers to $63,000,000, and 40,000 hands draw in wages $15,350,000, while $31,530,000 is annually paid for lumber, iron, steel, and unspecified materials. The total value of the annual product is placed at $68,640,486.

LAST Monday a bill was introduced in both Houses of Congress providing for holding a universal and Cotton Centennial Exposition in 1884, under the auspices of the United States, the National Cotton-Planters' Association, and the city in which the proposed exposition is to be made. The bill has been carefully drawn, and embraces all the features of the Philadelphia Centennial bill, with the exception of the subsidy feature.

HOUGHTON (Mich.) *Mining Gazette:* When the bears on raw copper want to stimulate a move to lower the price of the metal, they start anew the report that Lake Superior has great rivals. Last year Arizona and New Mexico filled the role in this direction. This year Montana and Nevada are to enact the character of competitors. We haven't heard intimated what localities will be selected in 1884 to wipe out the copper mines of this region.

A CONVENTION of representatives from twenty-nine of the leading rubber manufacturing companies of the United States, was held at the Astor House, New York, on Wednesday, to consider, among other matters, the advisability of forming a consolidated rubber company, which should include all first-class companies now doing business in this country. The plans for a formation of a consolidated rubber company were then discussed. Although nothing definite was decided upon, yet the sentiment of those present appeared to be in favor of the project.

THE East Tennessee Valley Zinc Co., organized with a capital of $300,000, has let contracts for the erection of the furnaces and buildings in Knoxville. They have several thousand tons of zinc ore already dug a few miles from that place. The furnaces will be in full operation by next spring.

Useful Hints.

The Evaporative Duty of Boilers.

The question of what is the best boiler for a man to use is a very important one, and at different times and at different places has to be decided by conditions surprisingly different from each other. We remember 12 or 14 years ago asking Mr. Root, well known in connection with the Root sectional boiler, whether the evaporative duty of boilers could not be greatly increased. A short time afterward he answered the question in a very direct way. He said he had figured the cost of making a boiler which should evaporate 11 pounds of water per pound of anthracite, and that, at the prices for labor and iron then prevailing, the interest on the extra cost would be more than the saving in fuel with coal at $6 per ton. If we remember rightly, the basis was on a boiler of 100-horse-power. We do not now recall the figures with any great definiteness, but the point made in the answer was well taken—that the interest on the extra cost would be greater than the saving to be effected by the improved construction. It is especially interesting to recall this answer at the present time, because, although 8 or 9 pounds of water was all that was claimed then by the very best makers, and, if we remember rightly, by Mr. Root himself, it was only a few years afterwards, in 1876, that he is credited with having evaporated about 12 pounds. In other words, as the price of the raw material and labor was reduced, the efficiency of the boiler was proportionately increased. We presume every scientific boiler maker in the country who has been in business for 10 or 15 yearss has had a similar experience, and has been able, as interest on capital and the cost of boilers decreased, to materially improve their efficiency. —*Mechanics.*

To Detect Flaws.

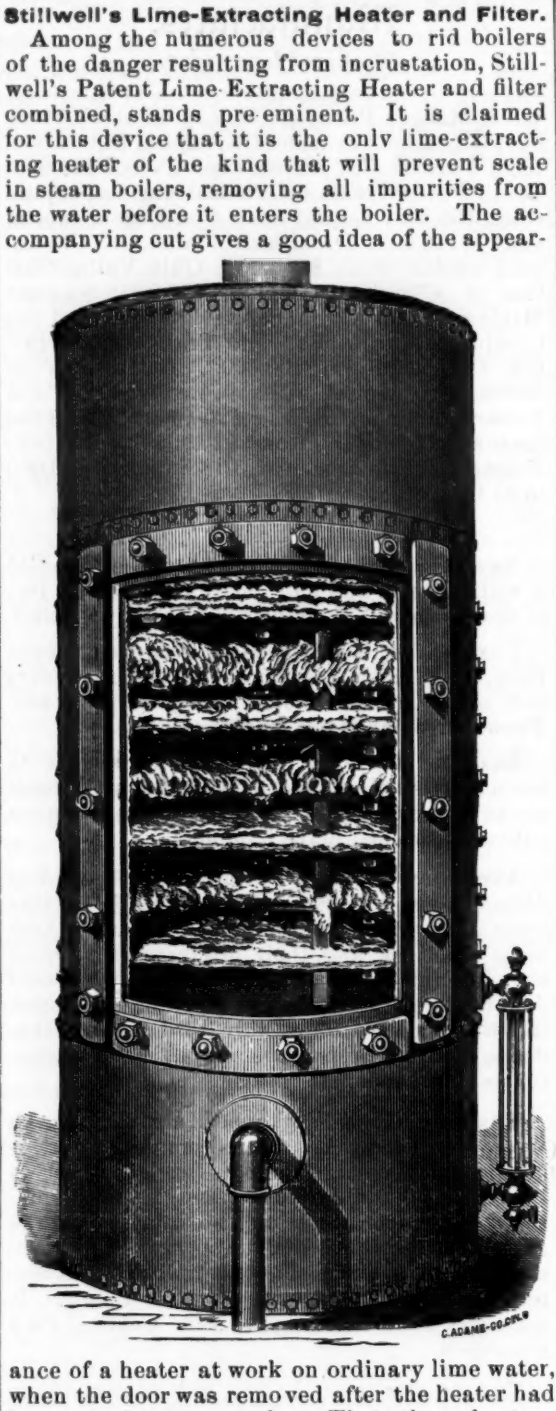
It is well known that in working iron, hollow places or flaws sometimes occur, with merely an outside skin over the defective parts, which any test but a destructive one would fail to discover. To test the homogeneity of the metal a bar is placed on the equatorial line. A compass with a very sensitive needle is passed along in front of the bar, the needle of course pointing at a right angle to it. If, however, there should be a flaw or hollow place in the bar the needle will be deflected as it passes from the solid to the hollow place backward toward the solid iron; passing on over the hollow place, the needle will come within the range of the solid iron at the other end of the flaw, and again will be deflected, forward. If the bar be cut through anywhere between these two points of deflection, a flaw will invariably be found.

How Hinges and Other Articles Are Polished.

Common articles of hardware such as screw eyes, hinges, handles, etc., are polished by tumbling in a revolving barrel. The tumbler is charged about half full with the goods mixed with the material selected according to experience as best suited to do the work. Small scraps of iron, sand and gravel with the attrition of the metal take away the roughness and put a moderately smooth surface to the work. Then charge the work into a tumbler partly filled with leather scrap or skivings cut fine, mixed with crocus or almost any fine polishing powder; after which it can be cleaned and brightened by an additional tumbling in sawdust and lime. The above is a general feature of this kind of work. Almost every manufacturer has some peculiar system of management suited to the special kind of work made. Some use oil or water, then boil the work in lime water, and again tumble in saw dust to dry and brighten. The black oxide of iron (anvil scales) is much used where it can be had. A little plumbago is sometimes thrown into the tumbler to give the work a shining black surface. A strong barrel or keg on trunnions with a small door for charging is the most suitable for small, light work. Much work that has a fine finish upon the surface is polished by boys, who handle the individual pieces against a large brush wheel with crocus or whiting. With a large wheel, the process is so quick that a boy will run through many thousand pieces in a day.

Stillwell's Lime-Extracting Heater and Filter.

Among the numerous devices to rid boilers of the danger resulting from incrustation, Stillwell's Patent Lime-Extracting Heater and filter combined, stands pre-eminent. It is claimed for this device that it is the only lime-extracting heater of the kind that will prevent scale in steam boilers, removing all impurities from the water before it enters the boiler. The accompanying cut gives a good idea of the appear-



ance of a heater at work on ordinary lime water, when the door was removed after the heater had been running two weeks. That these heaters have been thoroughly tested, is evident from the fact that over 3,000 of them are in daily use.

It consists of an iron vessel of suitable size, constructed of various shapes, but usually of upright, cylindrical form, into which the escape steam from the engine is exhausted. Where no engine is employed, it may be arranged for using steam direct from the boiler. The cold water intended for the boiler enters the heater at its top, and in its passage downward to its outlet is thoroughly boiled, which process liberates the free carbonic acid, sets free the salts held in solution and precipitates them upon suitable removable surfaces provided for their reception. Its action is as follows: The water enters at the top of the heater, and in its downward passage traverses a large area of heating and depositing surfaces, arranged in the form of removable shelves, having alternate openings. As the thin sheets of water pass over these shelves, all of which are very hot, and descend from shelf to shelf, it is met in its downward course and constantly acted upon by an ascending current of steam which enters the heater at the lower port. The action of this lower current of steam completes the separation and precipitation of the foreign particles which is begun when the water enters the heater. Not a drop of the water can pass down through it without being thoroughly boiled. The mineral impurities set free from the water are deposited upon the entire series of shelves, the deposit always being heavier upon the upper shelf and diminishing in quantity as it approaches the lower shelf. From this lower shelf the water passes through the filtering chamber, which completes the purification, and it is then fit to enter the boiler. Manufactured by Stillwell & Bierce Manufacturing Co., Dayton, Ohio.

Mining Notes.

THE Nimisilla mine, (Summit county,) recently flooded, has been pumped dry, and work was resumed.

PITTSBURGH miners on Tuesday adopted a sliding scale which they will present to the operators and report next week.

THE six months strike of the Neshannoc miners, near New Castle, has been ended by the men going to work at the reduction, 80 cents.

"AN OLD MINER" vigorously criticises, in the Akron *Beacon*, the recommendation of Governor Foster and State Inspector Roy, for a commission to investigate the screening question.

A NEW four-foot vein of coal has recently been discovered by the Wheeling Creek Coal Co., on their lands near Bridgeport, O. A late test of the coking properties of their coal resulted satisfactorily.

THE Roney mines, Martin's Ferry, were idle the greater part of last week, on account of the stoppage of the Cleveland mills, and no orders for coal. The miners have accepted the reduction from 85 to 75 cents per ton for mining.

WADSWORTH *Enteprise*: Shaft No. 2 resumed work yesterday at 80 cents. There was some dissatisfaction about the price to be paid for removing the coal already blasted, and a few of the miners left, but the balance went to work. Yesterday afternoon the miners from the lower mines, to the number of about 300, came up to Shaft No. 2 to remonstrate with the miners for working at the reduced rates, and result was they quit. It is rumored that shaft No. 1 (colored) is to be visited to-day for similar purposes.

THE Ohio Institute of Mining Engineers held its third annual meeting at Columbus last week with a largely increased attendance. President Andrew Roy presided. Very interesting and instructive papers were read as follows: R. M. Haseltine, of Youngstown, "Horsebacks in the Lower Coal Measures;" J. G. Chamberlain, of Leetonia, "The Early Mineral and Iron Interests of Columbiana County;" Wm. Smofford, of Zanesville, "Development of Mines in Jefferson County;" Hon. Andrew Roy, "Mineral Resources of Jackson County;" R. S. Paul, of Akron, "Boiler Explosions," and by Prof. Orton on "The Structures of the Lower Coal Measures of the State." The following officers were elected: President, Andrew Roy, Columbus; Vice President, Fred Howells, Zanesville; Secretary, R. S. Paul, Akron; Treasurer, W. H. Jennings, Columbus. Executive Board.—Mahoning district, R. M. Haseltine, Youngstown; Hocking district, W. H. Jennings, Columbus; Steubenville district, Fred. Howells, Zanesville; Jackson, Ironton and Pomeroy district, James Crown, Ironton, and Hon. Andrew Roy, by virtue of office; Massillon district, R. S. Paul, of Akron. Youngstown was chosen as the place for next meeting, and May 9 the time. Twenty-six new members were elected, and John R. Buchtel, of Akron, was chosen an honorary member. The Institute appears now to be on a permanent footing and is doing a good work.

The following is a statement in gross tons of the aggregate product of the mines and furnaces for each year since 1853, together with the value of the same:

Year.	Ore.	Pig Iron.	Ore and Pig.	Value.
1856*	86,319	.....	86,329	$ 258,957
1857	25,646	.....	25,746	76,938
1855	22,876	1,629	24,505	133,788
1859	68,832	7,258	76,090	575,529
1860	114,401	5,660	120,061	736,496
1861	114,258	7,970	122,228	775,832
1862	124,169	8,590	132,759	984,977
1863	203,055	9,813	212,869	1,416,935
1864	247,059	13,620	260,679	1,867,215
1865	193,758	12,283	206,041	1,590,430
1866	296,713	18,437	315,150	2,405,960
1867	465,504	30,211	495,715	3,475,820
1868	510,522	38,246	548,768	3,992,413
1869	639,097	39,003	678 100	4,968 435
1870	859,507	49,298	908,805	6,300,170
1871	813,984	51,225	865,209	6,115,895
1872	948,553	61,195	1,009,748	9,188,055
1873	1,196,234	70,507	1,265.741	11,395,887
1874	935,588	86,494	1,021,982	7,592,811
1875	910,840	81,735	992,593	5,788,763
1876	993,311	61,911	1,055,222	5,397,785
1877	1,025,129	29,685	1,054,814	5,299,598
1878	1,125,093	17,404	1,142,497	6,884,482
1879	1,414,183	39,583	1,453,765	11,413.114
1880	1,981,597	48,523	2,036,121	19,457,427
1881	2,321,315	52,953	2,374,268	20,498,613
1882	2,943,314	72,962	3,016,276	26,243,620
Total	20,585,757	916,213	21,501,970	$164,835,895

*As t previous.

Reviews.

JENKINS & THOMAS, 8 Spruce street, New York, favor the REVIEW with their very attractive Illustrated Year-book for 1883.

VOLUME 19 (July to December, two numbers) of the Essex Institute Historical Collection, Salem, Mass., is at hand—historically interesting and typographically perfect.

J. FITZGERALD, 30 Lafayette Place, N. Y., sends the REVIEW No. 40 of the Humboldt Library, entitled "The Scientific Evidences of Organic Evolution," by Geo. J. Romanes, F. R. S., with the reply of Dr. Conder and the rejoinder of Mr. Romanes.

ST. NICHOLAS for February of course does not forget St Valentine's Day. Sophie Swett writes of "A Queer Valentine," Anna North on "The Mission of Mabel's Valentine," and J. M. Anderson on "My Valentine." Joaquin Miller describes an ascent of Mt. Hood, and J. T. Trowbridge, Celia Thaxter, Mary Lowe Dickinson and a host of other well-known authors contribute to increase the brilliancy of the number.

"SARGOSSA" is entertainingly described by S. P. Scott in the February number of *Lippincott's Magazine*. The article is attractively illustrated. Other noteworthy articles are "Home-Life in Bombay," "This Our Brother" and "A Wayside Episode." The serials are increasing in interest, and the editorial departments are, as usual, well filled.

W. D. HOWELLS begins his new story, "A Woman's Reason" in the Midwinter (February) *Century*. The scene is Boston and the style is vivacious—what two elements better fitted to make a good story? "Led-Horse Claim" heightens in interest, as does "Through One Administration." The illustrated articles are five in number, the most profuse being those on "Artists' Models in New York" and "American Etchers." Edmund Clarence Stedman, Richard Henry Stoddard and Joaquin Miller are among the poetical contributors.

THE SOUTHERN CULTIVATOR for January is by far the best ever issued of that excellent periodical, the most entertaining agricultural journal ever furnished the Southern people. Dr. Jones continues his "Thoughts for the Month" and the entertaining "Inquiry Department;" articles also appear on Preparing Cotton for Market, Crop Lien Law, Railroads and Right of Way, Farm Tenants, Intensive Farming, Jute in the South, The Sugar Cane Question, Stock and Dairy Department, Bill Arp's Inimitable Letter, four full pages of correspondence directly from the farmers, biographical sketches and portraits of Senator Barrow and Maj. Campbell Wallace, a full discussion of fish culture, and the Patrons of Husbandry Department. Price, $1.50 per year, or ten copies one year for $10. Address Jas. P. Harrison & Co., Atlanta, Ga.

Does Advertising Pay?

The Portsmouth (Virginia) *Times* says, it is sometimes questioned by the merchants whether advertising pays. The question will hardly bear discussion in the light of the following facts, rates for transient advertisements being figured: "The Chicago *Tribune*, it is said, for a column a year receives $26,000. The New York *Herald* receives for its lowest-priced column $39,824, and for its highest $348,000. The New York *Tribune* for its lowest $29,764, and for its highest $85,648, and these papers are never at loss for advertisements to fill their columns. Their patronage comes not from any desire to assist the respective papers, but from business men who find it profitable to advertise."

Does it pay? A few days ago a friend of ours had gone into a manufacturing house in Baltimore in search of mining machinery. It was his intention to give an order for machinery for delivery within the next three months, which would have given the house a profit of not less than $2,500. While he was talking a solicitor called for an advertisement of machinery for a mining journal. He was told that the firm did not advertise. Our friend bowed himself out, and this notice may advise the firm why he never returns. He prefers to place his money with firms having enterprise and an eye to business, and will buy of those who can afford to advertise.

A firm of manufacturers in Philadelphia placed an advertisement in a journal as an experiment. They were economical Quakers, and commenced sparingly. Within three months their advertisements were running in seven different publications, and there is no question with them about its paying. As well might an enterprising firm try to save postage as the cost of advertising Customers go to those who may persistently extend them an invitation. Advertising pays a hundred fold.—*Industrial Review.*

The Modern Mercantile Agency.

One of the marvels of modern times is the mercantile agency. Away up at the top, is that of R G. Dun & Co. To tell where this far-reaching firm is *not* established, will be the difficulty. It has offices not only at 314 and 316 Broadway, and 80 Wall street, New York, but also at Albany, Atlanta, Baltimore, Binghamton, Buffalo, Burlington, Charleston, Chicago, Cincinnati, Columbus, Dallas, Davenport, Dayton, Denver, Des Moines, Detroit, Dubuque, Erie, Evansville, Galveston, Gloversville, Grand Rapids, Hartford, Houston, Indianapolis, Kansas City, Keokuk, La Crosse, Leavenworth, Louisville, Memphis, Milwaukee, Minneapolis, Mobile, Nashville, Newark, New Haven, New Orleans, Norfolk, Omaha, Peoria, Philadelphia, Pittsburg, Portland, (Oregon,) Providence, Quincy, Richmond, Rochester, St. Joseph, St. Louis, St. Paul, San Francisco, Savannah, Scranton, Springfield, Syracuse, Toledo, Troy, Utica, Williamsport, Allentown, Cedar Rapids, Cleveland, East Saginaw, Elmira, Fargo, Fort Worth, Jersey City, Las Vegas, Little Rock, Lynn, Montgomery, Oswego, Portland, (Me.,) Reading, Salt Lake City, San Antonio, Sioux City, Waco, Winnipeg, Montreal, Toronto, Hamilton, London, Halifax, St. John, Boston, Worcester, Lynn and London and Manchester, Glasgow, (Scotland,) Paris, (France,) and Leipsic, (Germany,)—94 in all. Each of these branches is sustained by liberal local patronage, alike testing and confirming the local information gleaned by a staff of reporters and travelers attached to each office, aided by an army of local correspondents. With all these aids, with an experience of over 40 years, a continually large expenditure and the employment of the best ability, with the reports kept constantly correct from their frequent use as a basis of credit, it is making no extravagant claim to say that the Mercantile Agency possesses, to-day, stores of information of the utmost value to its subscribers. These photographic reports are transmitted and interchanged between each of the 94 branches needing them. The subscriber has whatever benefit arises from this large expenditure, in the fullest details regarding his customers in their respective localities. The advantage enjoyed by the subscribers to an Agency having branch offices, over those connected with any institution having less than half that number, ought to be very apparent. If the ninety-four branches are, for years, liberally sustained by local revenue, it implies that the information in each locality must be gleaned in a manner satisfactory to those who, being on the spot, are the best judges of its reliability and completeness. If, on these reports, local transactions are constantly consummated. the information is as constantly tested and confirmed, or revised and amended; so that the result, so far as the locality is concerned, is a photograph of the local impression faithfully gathered. The subscriber has whatever benefit arises from this large expenditure, in the fullest details regarding his customers in their respective localities. The difference is, between having on the spot a well trained staff of agency men devoting their whole time to the work, spending a large local revenue, and constantly under the surveillance of local patrons, as compared with the opinions of a single unknown correspondent, constantly underpaid, if paid at all, who will have his own purposes to serve, and will certainly make the most—honestly if he can—out of the connexion. The Reference Book issued by this firm is indeed a monument of painstaking care. Its object is to afford merchants, manufacturers, bankers, and others granting credits, a ready and easy reference as to the capital and mercantile standing of parties with whom they may have transactions. The present work, (issued Jan. 1st,) now before us, contains 895,068 names—being an increase over the last book issued in January of last year of 25,425—while the corrections in styles and ratings for the present issue are 102,965. It will be seen, from these figures, that not only are the imperfections incident to a work of this character and magnitude being rapidly removed, but that the results of the current season's trade have been carefully noted. The Reference Book, however, is merely an outgrowth of a large and comprehensive system, inaugurated and tested by Messrs. Dun & Co., and their immediate predecessors, years before any such publication was dreamed of—a system which has for its basis a statement of all the facts and details gleaned from the best sources of information, which, year by year as they accumulate, make up the history of every business man in the country. The accuracy of these details is alike tested and vouched for by their constant use as a basis for credit by the large number of subscribers, whose confidence Dun & Co. have enjoyed for a period now extending over a quarter of a century. The Cleveland branch is under the management of Mr. R. P. Cattrall, a gentleman eminently qualified for the position by an experience in the business of upwards of 25 years.

Railroads and Telegraphs.

Contractor Cleveland, of the Pittsburgh, Cleveland & Toledo Railroad, expects to lay a mile of track a day as soon as he gets fairly at work.

The total tonnage of freight handled by the N. Y., P. & O. Railroad at Akron in 1882 was 418,389,479 pounds; receipts, $273,054.27; an increase of about 153,000,000 pounds over 1881.

According to the New York Commercial and Financial Chronicle, the gross earnings of the Cleveland, Akron & Columbus Railroad from January 1, to December 31, 1882, were $505,967, an increase of $82,268 over 1881, or about 20 per cent, for the entire year.

Much excitement was created in Jersey City Saturday night by the discovery and seizure of eleven boxes of the Mutual Union Co., at the instance of Jay Gould. J. G. Moore & Co., in whose possession they were, claim them, and the Mutual Union disavow all ownership.

It is now announced that Jay Gould has not only secured the Pittsburgh & Western (which is to come into Cleveland over the Pittsburgh, Cleveland & Toledo and the Valley roads) but also the Belt Railroad in Pittsburgh, and that his friends are building the new line between New Castle and Salamanca for a New York outlet of the Gould system.

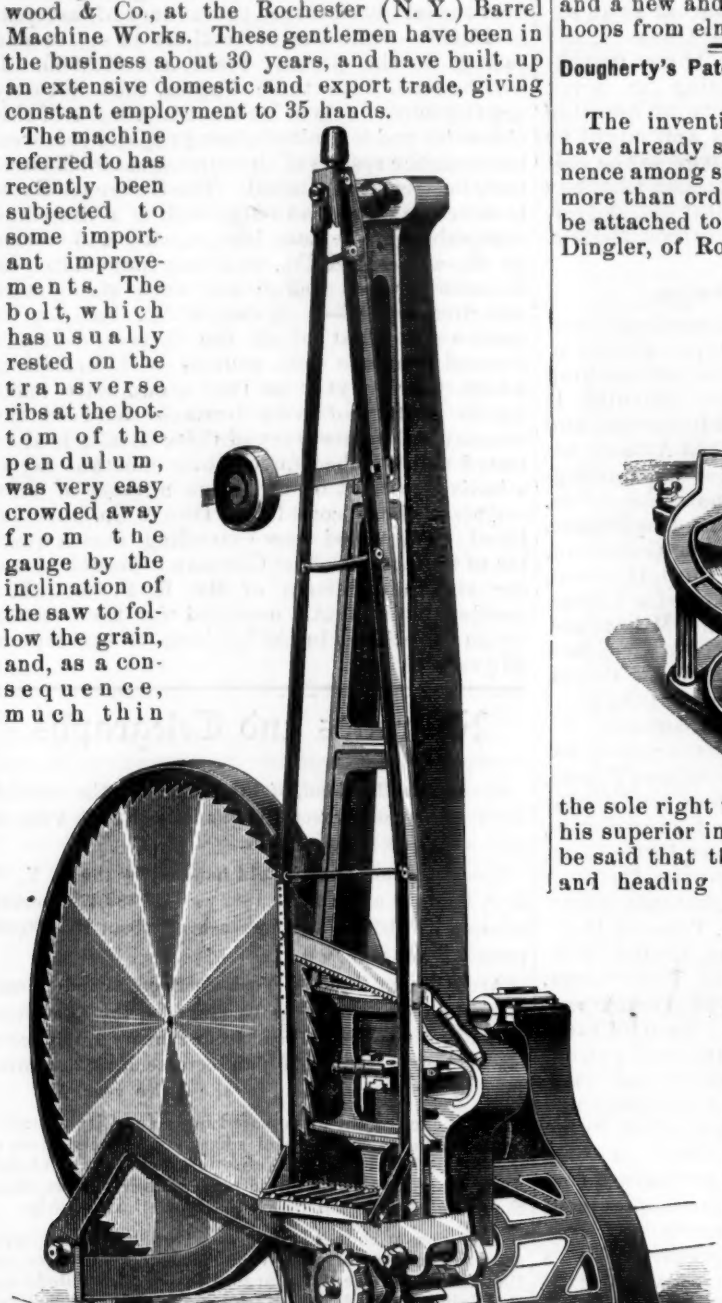
December earnings, so far reported (by 61 companies with about 47,300 miles of road, but not including several of the most important roads that report later), show an increase of 6.3 per cent. in total earnings, but a decrease from $500 to $487 in average earnings per mile—2½ per cent. Of the 61 roads reporting, 17 report smaller total earnings, which is a larger number than heretofore for several months.

Discussing Pittsburgh's new railroad outlets, the Telegraph says: The new B. & O. outlet to the west by way of the Pittsburgh and Southern is being pushed rapidly toward completion; Vanderbilt's Southwest system is a fixed fact, and the Wabash connections are nearing completion. There now only remain about 40 miles of the Wheeling & Lake Erie road to be completed in order to connect it at Wheeling with the Baltimore & Ohio and the Vanderbilt systems. It already controls the Marietta, Cleveland & Pittsburgh road, thus touching the lake at two points, Cleveland and Toledo. At Marietta it connects with the Cincinnati and St. Louis systems of the Baltimore & Ohio. Pittsburgh will have two connections with this system, which will give all the relief she could ask.

Referring to the recent resignation of Messrs. Payne and Stone, of this city, as Lake Shore directors, the New York Tribune of Tuesday says: An intimate friend of Mr. Vanderbilt said that the opposition by Lake Shore stockholders to any scheme proposed by him must necessarily be slight, because Mr. Vanderbilt and his adherents held the bulk of the stock. This fact was an assurance, in his opinion, that Mr. Vanderbilt would propose nothing which he believed to be hurtful to the prosperity of the Lake Shore or any other of the Vanderbilt roads. The resignation of Mr. Payne was occasioned, he said, partly by political motives and partly because he was one of the trustees of a Cleveland fund in which there was some Lake Shore stock. A law of Ohio forbids the consolidation or leasing of parallel roads, and Mr. Payne's respect for this law had led probably to his resigning his seat in the Lake Shore directory.

Improved Pendulous Shingle and Heading Sawing Machine.

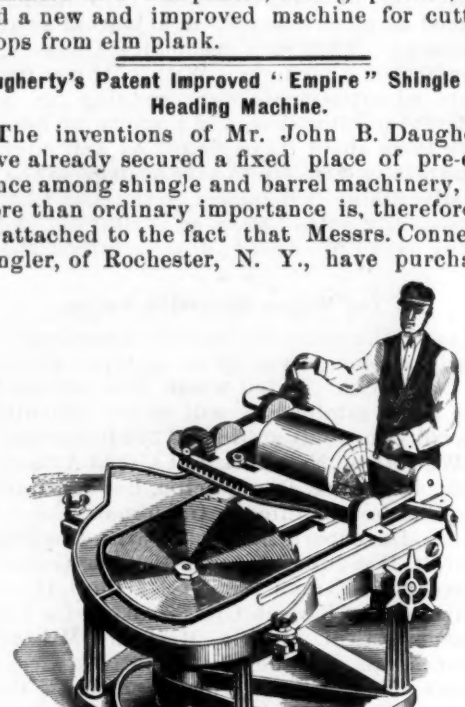
The striking illustration herewith given, is of the Improved Pendulous Shingle and Heading Sawing Machine, manufactured by John Greenwood & Co., at the Rochester (N. Y.) Barrel Machine Works. These gentlemen have been in the business about 30 years, and have built up an extensive domestic and export trade, giving constant employment to 35 hands.



The machine referred to has recently been subjected to some important improvements. The bolt, which has usually rested on the transverse ribs at the bottom of the pendulum, was very easy crowded away from the gauge by the inclination of the saw to follow the grain, and, as a consequence, much thin heading was made, particularly when the bolts were frozen. By a very simple device a serrated bar is placed at the bottom, and connected the one with the handle at the top, so that they work in opposite directions, and when one strikes the top of the bolt the other enters it at the bottom, holding the bolt firmly between the two rows of sharp steel teeth seen in the engraving. When the handle is raised the toothed bar at the bottom drops below the transverse ribs, and the bolt slides freely on the transverse ribs up to the gauges. The saw and its stiffening collar are attached to the fixed collar on the arbor by one nut on the end of the arbor, said nut being countersunk flush with the face of the saw, allowing the bolt to swing past the center, and saving considerable time in changing saws. The gauges can be set for different thicknesses of heading, or for tapering tight barrel heading almost instantly. The standard for the support of the pendulum is perpendicular over the foot of the machine, insuring solidity. The pendulum is of wrought angle well braced. The saw is well protected with a strong cast iron guard. The pulley and the balance wheel are cast in one piece, and the pulley, being without spokes, is turned the inside of the rim, insuring a more perfect balance. Greenwood & Co. also manufacture stave-cutting machines, bolt and stave equalizers, spring stave jointers, shingle and heading sawing machines, sawed stave planers, heading and surface planers, six-knife wheel jointers, improved heading turners, truss-ing machines, crozing and chamfering machines, tight barrel head turners, bolting saws, combined jointer and doweling machines, machines for flaring and punching iron hoops, saw gummers and sharpeners, baling presses, etc., and a new and improved machine for cutting hoops from elm plank.

Dougherty's Patent Improved "Empire" Shingle and Heading Machine.

The inventions of Mr. John B. Daugherty have already secured a fixed place of pre-eminence among shingle and barrel machinery, and more than ordinary importance is, therefore, to be attached to the fact that Messrs. Connell & Dingler, of Rochester, N. Y., have purchased



the sole right to manufacture the products of his superior inventive genius. It needs only to be said that the Dougherty "Empire" shingle and heading machine, (herewith illustrated), the Dougherty "Swing" shingle and heading machine, the Dougherty improved automatic barrel-head turner, and the Dougherty patent hoop machine have actually worked a revolution in the barrel-making trade to demonstrate the importance of this arrangement with the skilled and practical patentee. The "Empire" above referred to, deserves a more detailed description. It has a direct movement, carrying the block on a carriage that is relieved from friction by patent relief rollers, which take the cut of the saw with such ease that it is almost self-acting. It can be changed from heading to shingles in five minutes, cutting within that time fifty pieces of heading and the same number of shingles. The shingle attachment is operated by the motion of the carriage, changing the butt and point of the shingle alternately, without the assistance of the operator. The saw arbor boxes are hung on trunions, which keep them in line and allow the saw to be adjusted to the proper angle to clear the block, and the boxes are self-oiling. They can be set to take blocks from 6 inches to 27 inches long and 16½ inches wide. The machine will cut, with an ordinary hand, 20,000 shingles, or 20 cords single length heading bolts, in ten hours, making no thin pieces. Besides the above machines, Connell & Dengler manufacture heading planers, stave cutting machines, shingle and heading jointers, stave jointers and listers for jointing dry barrel staves, stave equalizers, stave mandrils, drag saws, etc. To a REVIEW representative they stated that business was never better, and that shipments were made all over the country, New York State trade being particularly heavy. They employ 40 hands.

A NOTE dated on Sunday is void; one obtained by fraud, or from an intoxicated person is void. If a note is lost, or stolen, it does not release the maker of it. A minor's note is not valid. Notes bear interest only when so stated on the face. Ignorance of law is no excuse. Signatures with lead pencil are valid. A receipt for money is not conclusive proof of payment. Acts of one partner bind all the others.

The Largest Pump Works in the World.

The visitor to Seneca Falls, N. Y., will at once be struck by the magnitude and completeness of the works of Rumsey & Co., manufacturers of pumps, fire engines, rams and other hydraulic machinery. This may justly be said to be "the largest manufactory of the kind in the world." It was founded in 1840, and now employs 260 hands. The firm ship their goods all over the world and report trade good, with plenty of orders on hand to keep them running for some time to come. Out of innumerable articles of pumping machinery made by them, we select for illustration two steam boiler pumps, of which, however, they manufacture over 40 different styles and sizes.

They have lately added many new pumps and other hydraulic machines to their list of manufactures. With their practical experience of forty years in the production of these lines of goods, their extensive facilities, unrivalled water-power, modern and improved appliances of machinery and buildings, and skilled assistants, they are enabled to supply all reasonable demands from any domestic or foreign market. They received the highest awards for pumps and fire engines at the International Exhibition, Philadelphia, the Fair of the American Institute, 1876, and also at the Australian Expositions of 1880.

Relative Longevity in Various Occupations.

An interesting exhibit of the mortality in the different walks of life, was furnished by the General Register in report on the death rate of the whole population of England in 1851. From this it appears that out of every 1,000 persons between the ages of 25 and 55, 40 died on an average. Classified according to the most favorable mortality, and increasing downward, we have the following tables:

Below the Average.	Above the Average.
1. Merchants.	7. Miners.
2. Weavers.	8. Tailors.
3. Cobblers.	9. Bakers.
4. Carpenters.	10. Butchers.
5. Blacksmiths.	11. Liquor dealers.
6. Laborers.	

The mortality of the 11th class is so great that, in good companies, they are only admitted with great caution, and on short endowment or term policies.

Mariners, also, are considered poor risks, as 35 per cent. of the deaths among them are attributable to accidents. Among miners 25 per cent., among machinists 15 per cent., and among painters, well diggers and glaziers, 10 per cent. die in consequence of casualties. The callings of brewer, type-setter, tinsmith, lithographer and stone-cutter, are also in a measure detrimental to a prolonged duration of life.

THOSE newspapers which prate nonsensically about dull trade, should reflect that this is not the busy trade season. It is settlement time, and people are not buying briskly. They are merely answering present needs. Possibly business is not just what might be wished, even under these conditions; but it is little, if any, inferior to that enjoyed in January last. There is no reason to bewail slack trade just yet—. *Cincinnati Trade List.*

EXPERIMENTS made with cypress and walnut, and cypress and cedar, all prove that they will rot each other while joined together, but, on separation, the rot will cease, and the timbers remain perfectly sound for along period.

A Pump with Many Novel Points.

In old colony times, the "Old Oaken Bucket" was commended as the most convenient method of drawing the water from the old fashioned wells lined with rugged stone; later, when it was found that wells of greater depth must be dug to avoid surface water, the long tubular bucket came into general favor. The utter incompleteness of this led to the use of force pumps. One of the most prominent among these stands the Myers Iron Force Pump. Its simplicity, durability and the ease with which it is operated, make it a favorite to the trade. For some time Mr. P. A. Myers has been experimenting so as to construct a perfect force pump that could be placed in drilled wells of small diameter. This had never been accomplished by any force pump known to the trade, at the same time throwing an even stream, and allow the casing to begin at the top of the ground. But it is now perfectly consummated in the "Submerged Cylinder Drill Well Pump," which was patented some time since by Mr. Myers, and recently put upon the market by F. E. Myers & Bro., of Ashland, O., the manufacturers of Myers' Force Pumps, haying tools, and hay carriers, at Ashland, Ohio. A cut of this, put up, is appended.

Submerged Cylinder. Figure A.

Lift Cylinder. Figure B.

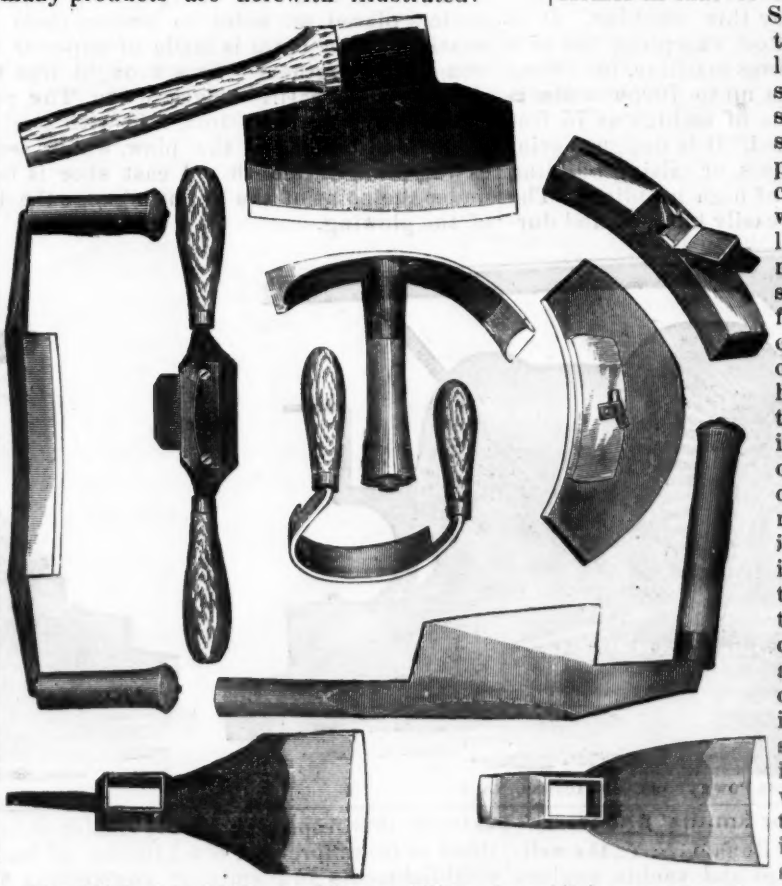
The pump, entire, is made of iron; the interior of the submerged cylinder is lined with porcelain, while the lower cylinder is all brass with brass plunger, and is constructed so as to be especially adapted to drilled wells. The construction of the pump is very simple. The submerged cylinder is slightly less in diameter than the interior diameter of the pump barrel in which it is located, leaving an annular water space around it. This cylinder is held in place by a central tube, which extends through the barrel and is fastened to the cap or head of the pump. The piston rod extends through this central tube, and is connected with the plunger in the submerged cylinder, and with the lift bucket of larger diameter than the plunger. The submerged cylinder, in which the plunger bucket works, is half the diameter of the lower cylinder in which the lift bucket works This cylinder is placed five feet below the platform. The upper and lower cylinders are connected by a pipe with a rod running through them to connect and operate the upper and lower plungers. The cylinder in which the lower bucket works, should be placed near the bottom of the well. When the lift bucket, and piston are set in operation, water will be forced from between the lower ends of the submerged cylinder and the lift bucket, into and through the annular space around the submerged cylinder, and as it rises, acts against the air contained in the pump barrel above the spout opening, so that immediately after the stroke, the reaction of the air in the upper part of the pump barrel is against the top of the column of water forcing it down. This gives a large amount of reaction and a very even flow of water. This pump is distinct from all other force pumps, in that it has no stuffing boxes, and is built with a windmill head, so that it can be used with any form of wind engine. A special feature of this pump is that the leather packing of the plunger bucket is pressed over an expansive rubber disc, and if, at any time, after continued use, the upper bucket loses any water, it can be properly fitted by turning a brass nut on the bucket, which throws the leather out to the walls of the cylinder properly. It is adapted to successful use in any well up to 150 feet, and is built especially for deep wells. It possesses unusual merit when throwing water in case of fire, sprinkling grounds, or any use where a great force is required.

Mr. Myers is to be commended for the production of so complete and perfect a force pump, which is recognized by all mechanics to be at once novel in its construction, and one which will fill a long unsatisfied demand. The Messrs. F. E. Myers & Bro. will have the exclusive manufacture of this pump, and they are already making extensive preparations to supply the trade. They have been thoroughly tested and not one of the many already upon the market has failed to give perfect satisfaction.

THE TRADE REVIEW is the best medium through which to reach the metal men, manufacturers, wholesalers and business men in general, throughout Ohio and adjoining States. Its patronage is growing and its circle of influence rapidly widening.

L. & I. J. White, Edge Tools and Machine Knives, Etc., Buffalo, N. Y.

One of the oldest and most reliable manufacturing firms of Buffalo, is that of L. & I. J. White, who make carpenters', coopers' and ship tools, cleavers, choppers, planing and moulding machine knives, etc. Some of their many products are herewith illustrated:

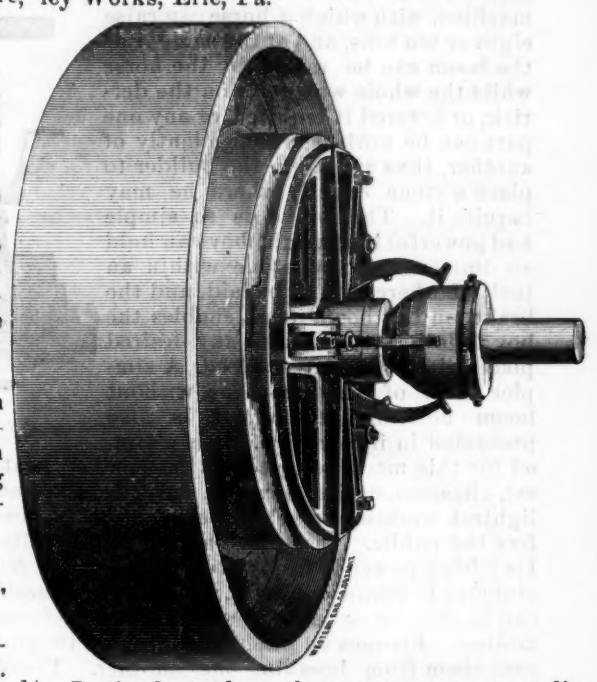


Established in 1837, the Messrs. White have extended their trade until they now ship all over the Union and even to Europe. They report the past season's trade very good. They use none but the best English steel, and all articles manufactured by them are stamped with their names in full and warranted. They employ only the most experienced hands, most of whom have been with them for many years, and over whom they exercise a direct personal supervision.

AT the Nuremburg exhibition was shown a novel use of bricks of cork. These bricks have only been used for building purposes, on account of their lightness and isolating properties; but they are now also employed as a covering for boilers, and are said to excel even abestos.

Concerning Friction Clutch Pulleys.

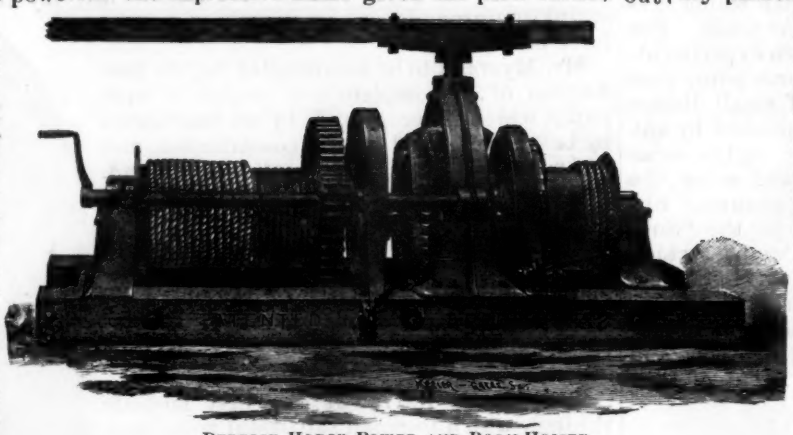
A fruitful source of vexatious delays familiar to every manufacturer, is that arising from illy constructed and carelessly adjusted pulleys. How to remedy these defects and reduce to a minimum the consequent annoyances, has been the subject of much study. The embodiment of all that is really excellent and practical in these tentative efforts, is claimed to be the Newell Patent Wooden Pulley and Taper Sleeve Fastenings, manufactured by the Taper Sleeve Pulley Works, Erie, Pa.



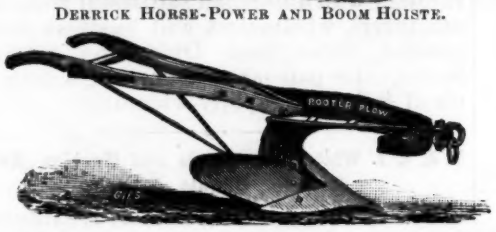
In the first place, they overcome a great disadvantage of iron pulleys by adopting a wooden pulley, which, they claim, is far superior to the former in that it holds the belt much better. Secondly, it is claimed for the wooden pulley that it is lighter than iron, and in thus saving weight on the line shaft and bearings, thereby saves in friction as well as expense. To recapitulate the claims made for it over other wooden pulleys: It is the lightest and strongest pulley made; it cannot get out of shape; it is in the most perfect balance; it is an interchangeable pulley; it is thoroughly water-proof, and it holds the belt the best. For the Taper Sleeve Fastening, it is claimed that it is the only true fastening—a pulley once properly balanced, can not be thrown out of balance in securing with this fastening; that there are no projections, as in the set-screw fastening, to catch belts or clothing and endanger life and limb; that this method of fastening does not mar or injure the shafting in the slightest degree—no weakening of shafts as from keyways, or burs or rings, as in the use of set-screws; there is no delay from broken set-screws or rusted keys when it is necessary to move a pulley, and thus it is a more secure fastening than a set-screw in any case, and more so than a key as ordinarily fitted. The present management of the Taper Sleeve Pulley Works took charge in 1877. Their Friction-Clutch Pulley was brought out in 1879. The pulley has a re-entrant flange, the outer and inner faces of which are gripped by maple-faced iron jaws, operated by a coned hub, and, being adjustable, this action may be as gradual as desired. They are sure, strong and noiseless, and loads can be started at any speed with ease and safety. They have lately made great improvements in their clutch pulleys and cut-off couplings, and have overcome the difficulties caused by the shafting being out of line. Orders are numerous, and shipments go into nearly every State.

Supplying Contractors' Plants.

There was established in Buffalo, N. Y., last April, the Contractors' Plant Manufacturing Co., the design of which is to make and supply all kinds of contractors' machinery, and thus to supply a want long felt in this direction. They have lately occupied a fine new building, in which they are placing all new machinery of the most approved patterns. The size of the building is 40x142, two stories high. We illustrate a few of their specialties. The Derrick Horse-Power and Boom Hoister is a powerful machine, with which a horse can raise eight or ten tons, and at the same time the boom can be raised by the horse while the whole weight is on the derrick, or lowered if required, or any one part can be worked independently of another, thus enabling the builder to place a stone exactly where he may require it. The brake is so simple and powerful that a light boy can hold an immense heavy stone within an inch of where it is to be laid, and the brake on the boom drum enables the boy to lower the boom to any desired place with the greatest speed. A simpler form of this machine, without boom hoisting attachment, is also presented in illustration. It is claimed for this machine that it is the smallest, neatest, cheapest, easiest handled, most durable and lightest working machine ever brought before the public. It works on cast-steel shafts. Its lifting power is from three to five tons. No clutches to throw out or in, and the gear wheels can be put out or in gear when the horse is in motion. Flanges on pitch line of gears to prevent them from breaking one another. There are no bolted boxes to get loose. It has gearing attachment to take up slack rope by hand, and a powerful brake to hold the stone whenever required. A stone three or four tons weight can easily be handled by this machine. It is all made of iron and steel, excepting the sills and sweep. A horse-power machine, for lifting at a rapid rate, weights up to 700po unds, is also represented. A rate of as high as 75 feet per minute can be reached. It is designed principally for mining purposes, or raising building material in the erection of high buildings. The machine is small, light, easily handled and durable, sufficiently strong to do the desired work. It can be thrown out or in gear when the horse is in motion. A powerful brake band is applied to the drum itself so that in case of an accident to the driving gear the drum still remains wholly under the control of the driver. He can hold the weight where it may be required or lower it at any desired speed. The drum works on a steel shaft, smooth and easy. There is an attachment on the drum to take up slack rope by hand. The "Rooter" is the expressive name given the plow turned out by this company, for work on canal and railroad grading. The Rooter is made entirely of iron, excepting the handles, which are made of the toughest rock elm that can be procured, and are firmly braced with wrought iron braces and fenders placed on sides to protect them from wearing. The beam is made of superior cast-iron and strengthened by a wrought iron truss shrunk on the entire length of it. The points are of heavy wrought iron, laid with steel and locked and bolted to the plow, which secures extraordinary strength. A cast shoe is bolted under the point of the beam to gauge the depth of the plowing.



DERRICK HORSE-POWER AND BOOM HOISTE.



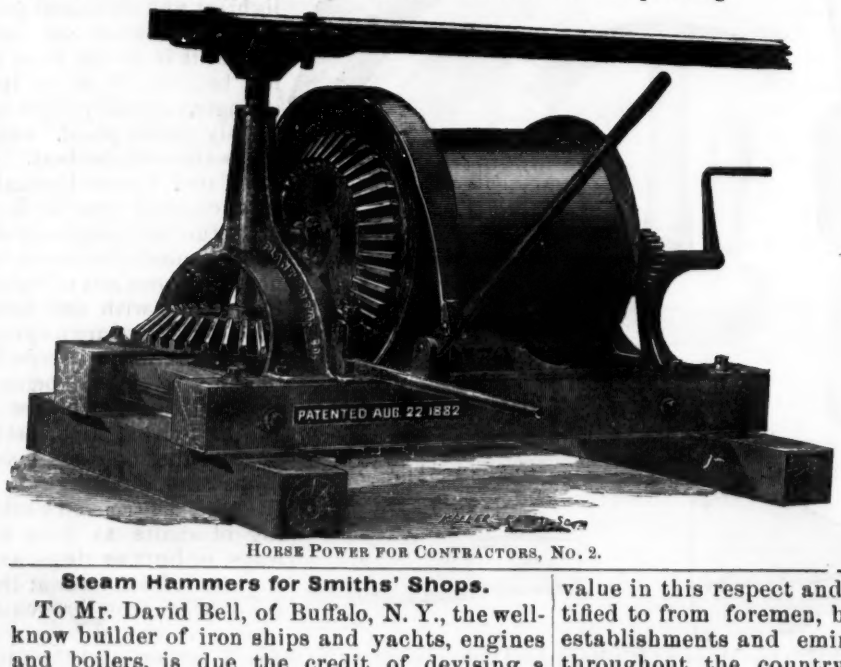
Cleveland Iron Ore Paint Co.

In no one thing should greater care be taken than in the selection of paints for roofs, large structures, steamboats, cars, bridges and any extensive works that are subjected to the wear and tear of the elements. To be effective, it must possess adhesiveness, elasticity and a heavy body. All of these requisites are met in the Iron Ore Paint manufactured by the Cleveland Iron Ore Paint Comp'y. By the use of their improved machinery they pulverize the dry paints very fine, thus making it easy to mix with oil, producing, when used, a very fine and smooth surface. So pure is the iron ore used, that the paint partakes of the nature of iron. Their justly popular red paint is made from the best Lake Superior iron ore, and their purple paint is produced from the Jackson ore. The latter is particularly appropriate for coating iron vessels, bridges, etc. By the use of the purest linseed oil in grinding, their paints do not dry out as do those ground in fish oil, etc. Pure paints are also prepared, of superior finish, ready for the brush. The company also make a cheap (though not inferior) roof paint, both red and purple. Taken with the Garry Iron Roofing Cement, for cementing up holes and breaks in old tin and iron roofs, it makes them at once perfectly tight and restores them to use. No better commendation of these paints can be had than their wide-spread popularity, and the certificate which Prof. E. W. Morley gives them, as made up of the purest and best constituents.

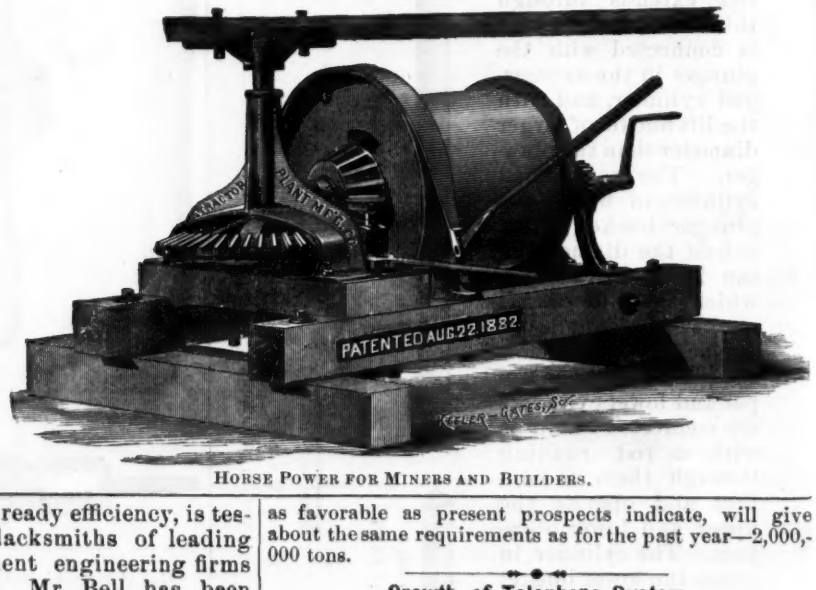
Jones & Van Wie, Cleveland.

Among the active business men of Cleveland, who are doing so much to shove the Forest City to the front, are Messrs. Jones & Van Wie, 221 to 225 River street. Their trade, which embraces both new and second-hand machinery, is principally in Ohio, Indiana, Michigan and Western New York. They carry one of the largest stocks of machinery in the city, and are always fully alive to the wants of the trade. Business, the past season, has been very good.

THE Baldwin Locomotive Works, at Paterson, constructed during the year 1882, 563 locomotives, of which number 443 were for the United States and 120 for foreign countries.



HORSE POWER FOR CONTRACTORS, NO. 2.



HORSE POWER FOR MINERS AND BUILDERS.

Steam Hammers for Smiths' Shops.

To Mr. David Bell, of Buffalo, N. Y., the well-know builder of iron ships and yachts, engines and boilers, is due the credit of devising a steam hammer which, for the lighter work of the smith's shop, counted no predecessor and has no equal. It has a single column standard which, with the cylinder and plate, is cast in one piece. The die block being cast separately, is strong, self-acting, and takes steam at both ends of the cylinder. The cylinder diameter is 10 inches; the stroke or lift 22 inches, and it will strike a blow of 6,000 lbs. The average diameter of shaft, which it will easily beat out at a single heat, is 7 inches. The price is $700. Two smaller sizes of steam hammers are made, having respectively 16 and 20 inches lift, and delivering a blow of 2,000 and 4,000 lbs, and costing the one $400 and the other $500. Mr. Bell's hammer is economical in use, and its value in this respect and ready efficiency, is testified to from foremen, blacksmiths of leading establishments and eminent engineering firms throughout the country. Mr. Bell has been established in the iron construction business for ouer 40 years, and employs upwards of 70 hands.

Steel Rails in 1882.

The production in 1882 was 1,200,000 tons; the product of iron rails 250,000 tons; imports, 200,000 tons; total consuption in 1882 was about 1,950,000 tons. As the price of steels rails is below the cost of iron, there will probably be none rolled in 1883. As prices are below cost of importing, it is probable that the home Bessemer plants will have all the business, and the capacity of the mills is fully 2,500,000 tons. As the building for 1883 is uncertain, the prospect is somewhat so. The sidings and double trackings will probably take 750,000 tans, while the heavier weight will will add some 150,000 tons more. The reports of new roads and the additional constructions, provided the business of the year remains as favorable as present prospects indicate, will give about the same requirements as for the past year—2,000,000 tons.

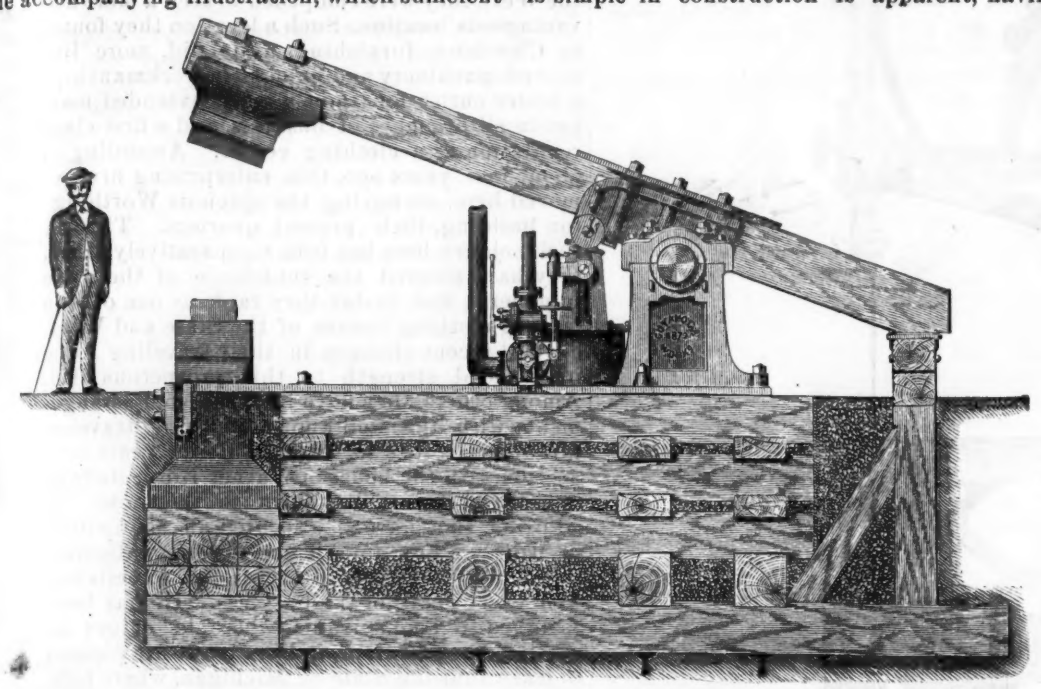
Growth of Telephone System.

It is but six years since the telephone system came into use, but its growth within that period has been marvelous. According to statistics recently published by the Compagnie Internationale des Telephones at the beginning of October of last year, the telephone is in more general use in America than in any other country. There is now in the United States more than 100,000 subscribers. New York leads the list; Chicago is second and Paris third. A calculation of the ratio of the number of subscribers, shows that in a large number of small towns in America, there is a telephone to every 20 inhabitants; in Chicago and in Zurich the proportion is about one per 200; in New York one per 500; in Brussels one per 800; in Paris about one per 1,000; in Berlin one per 2,000; in London one per 3,000, and in St. Petersburg only one per 4,000.

"NEW MACHINERY" is a special feature of the TRADE REVIEW each week.

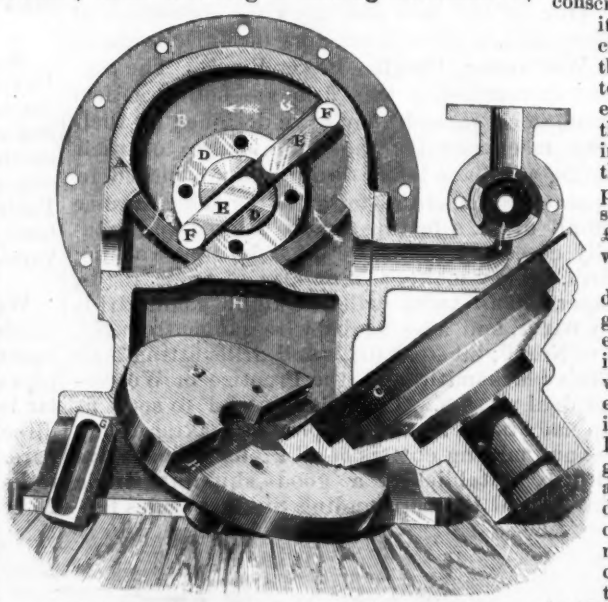
New Work of Cleveland's Oldest Iron Works.

Already famous for the building of large helve hammers, the Cuyahoga Steam Furnace Co. have recently brought out a small hammer of 1,000 pounds weight, intended for railroad shops and large blacksmith establishments, which they expect soon to put on the market. Their style of hammer is admirably shown in the accompanying illustration, which sufficiently explains itself. One of the important improvements of their hammers over the usual style of helve hammers, is the kind of steam valve and valve motion used, and its location on the steam cylinder. The valve used is known as the semi-rotating slide valve, having a patent steam balance on its back, which, while very simple, is effective in relieving the valve from a large share of the steam pressure upon its face, and consequently relieves the valve gear from friction and wear. This steam balanced valve is located on the side of the steam cylinder towards the anvil block, and is at or near the bottom of the steam cylinder; thus making the steam port short and direct, so that at each stroke of the piston the condensed steam is drained from the steam cylinder. This kind of valve, as arranged by this company, enables them to use a long, narrow steam port, which gives the hammer a quick, sharp action; while the unusually large and direct exhaust port allows the steam from under the piston to discharge so freely, that the blow of the hammer head is much greater than in any other hammer of the same size and weight. That the smaller hammer will have a sale commensurate with its merits there can be no doubt, when they come to be examined by practical men. These works represent a continuous history of nearly 49 years, being, indeed, the pioneer manufacturing establishment of Cleveland. The word "steam" in the name of the company was its distinguishing feature at the time of organization, the works boasting of a steam engine hauled up through the woods from Pittsburgh—a great curiosity. Though manufacturing a great variety of machinery, extending its line of works to anticipate the growth of commerce and manufactures, if it were asked in what particular class of machinery the Cuyahoga Steam Furnace Co. had built most largely as well as most successfully, it would doubtless be answered, the largest class of stationary and marine engines, blowing engines for blast furnaces and steel works, steam hammers and steam stamps for copper mines. To its financial credit it can be said that the establishment has never been closed up except possibly for a few weeks during the panic of 1857; that it has never been the scene of any strike or disorder of any kind, and that many of the workmen have been with them from fifteen to thirty years, and in all this time have never failed to find their money ready for them when pay day came. Much of this success has been due to the several men who have successively managed its affairs. Charles Hoyt was its first manager; Elisha F. Sterling, its second; Wm. B. Castle (afterwards Mayor of Cleveland), its third, at whose death Mr. J. F. Holloway, who for many years had been the superintending engineer of the works, assumed its business management as well.



The Noteman Rotary Engine.

The accompanying cut represents a sectional view of the Noteman Rotary Engine. That it is simple in construction is apparent, having



follows: A represents the case or cylinder. B is a revolving head, which is bolted to the revolving hub D when in operation. EE represents the sliding piston, having movable shoes, FF, at the ends, which have a circular bearing at the ends of the piston and a flattened surface equal to two thirds of the diameter which faces the inside periphery of the case; G represents the yokes, which being placed as designed on the sides of the piston hold the shoes in position, and allow them to oscillate when the piston is in motion sufficiently to face the different angles of the inside surface of the cylinder as they pass around, thus assuring a sliding movement at any point traveled over. The piston being cut in halves, the wear of the shoes is taken up by suitable spiral springs placed between them, which hold each part out, packing them tightly against the cylinder. The slot in the revolving head B, is fitted to receive the yokes G, so that when in proper position and in motion, the yokes, which carry the piston, travel back and forth across the slotted heads as it revolves. C represents the cylinder-head, recessed to receive the revolving head B, which, being bolted to the case, is operated as follows: Steam being admitted, the cut-off valve, I, opens and the steam enters the cylinder, when the pressure acts directly on the piston E, forcing its extended end around to the exhaust port, in which movement the piston has changed positions so that the opposite end of the piston passes the exhaust port, allowing the spent steam to escape. Thus the steam takes effect on each end of the but seven important parts. It is described as piston alternately, taking steam and exhausting but twice to a revolution, making it possible to set the cut-off valve so as to take steam and cut it off at any desired point. This is certainly a new and important feature in rotary engines, and will go far towards removing the existing doubts as to their economy in the use of steam, and as they are economical in price, weight and floor space, and also in expenditures for repairs, we see no reason why they will not become popular with the users of steam-power generally. They are built exclusively by the Noteman Rotary Engine and Steam Pump Co., at Toledo, Ohio, where further information in regard to them may be had.

THE OUTLOOK FOR COPPER.

The United States at the Head of Copper-Producing Countries.

The estimates now made place the home copper production of 1882 at about 90.000,000 pounds, or 40,000 tons of 2240 pounds. In 1881 it was only about 72,000,000 pounds, or 32,000 tons. If the figures of 1882, as above given are confirmed, aud we have every reason to believe they will be, there will prove to have been an increase of something like 20 per cent. in a single year, which would be simply enormous. As there is every probability that we shall go on increasing in 1883 at about the same rate, the question arises whether between the competition which Lake copper is bound to experience on this coast with copper from beyond the Mississippi, and a possiby dull spring trade, the price now ruling in this market for Lake can be maintaiued much longer. To judge from the tendency which prices of copper not Lake have lately shown, there are certainly grave doubts on this subject. Some people in the metal trade are of opinion that the export of copper in the unfinished state, from the West to Europe, will this year assume unexpected proportions, but we prefer not to be too sanguine in this respect. Others believe that a larger export of Lake copper will come to our relief. As this, however, is altogether a matter of price, it is a prospect equally uncertain. Europe is likely to get copper enough from other quarters. The chances are that even the Chilian output will recover from its decline. This decline has been remarkable. In 1879 Chili exported over 49,000 tons; in 1880 a little over 43,000; but in 1881 dropped to a total export not exceeding 38,000 tons. In 1882 there was a slight recovery, for during the first 11 months of the year the charters were 36,800 tons, against 34,500 in 1881; 38,500 in 1880, 47,000 in 1879, 45,000 in 1878, 39,900 in 1877, and 45,600 in 1876. It seems that during late years many of the poorer mines in Chili have been forced to suspend operations in consequence of higher wages, due to scarcity of labor and lower prices of the metal. All this disturbance in the labor market on the West Coast has arisen from military conscription. This unfortunate war seems to approach its end now, however, if we can trust the assurances coming from there, and with the gradual return of the army of occupation, the labor difficulties will terminate by degrees. Europe may, in such an event, receive something like 45,000 tons from Chili this year. If it does, nothing but speculative holding can, in our opinion, keep up present prices there, for Rio Tinto is as lively as ever as a copper producer, to judge from the dividends it pays. It should not be forgotton that Chili bars, worth now £65, stood at £58.10 December 1, 1878, when Chili was producing normally.

The producer of copper will answer that, nowadays, the world's consumption of the metal is much greater than it was then, and that electrical engineering alone absorbs amounts at the time believed impossible. We grant that this is the case, but would remark that much of this extra demand was experienced in the years 1881 and 1882, and that it is by no means certain it will be as great this year. In a good many branches of industry suddenly growing to unexpected proportions in this country and Europe, there has been a rush for raw material during a year or two, followed by a lull and a decrease after the permanent improvements had been made. While this may repeat itself in the case of copper in this instance, all probabilities point to the greatest activity in production, and, as we have said, in this respect even Chili is apparently on the eve of recovery. For the moment we have the honor of being at the head of the copper-producing countries, for last year we advanced a trifle above Chili, formerly the leader of the list. This is very good so long as we can sell our copper at ruling rates, but the day may not be far distant when we cannot, because suffocated by our own over-production without a sufficient outlet abroad. Last week consumers again took courage and bought 12,000,000 pounds of Lake copper, for gradual delivery, at the high price of 18c, it is stated. Whether this was a timely purchase, the future will tell.—Iron Age.

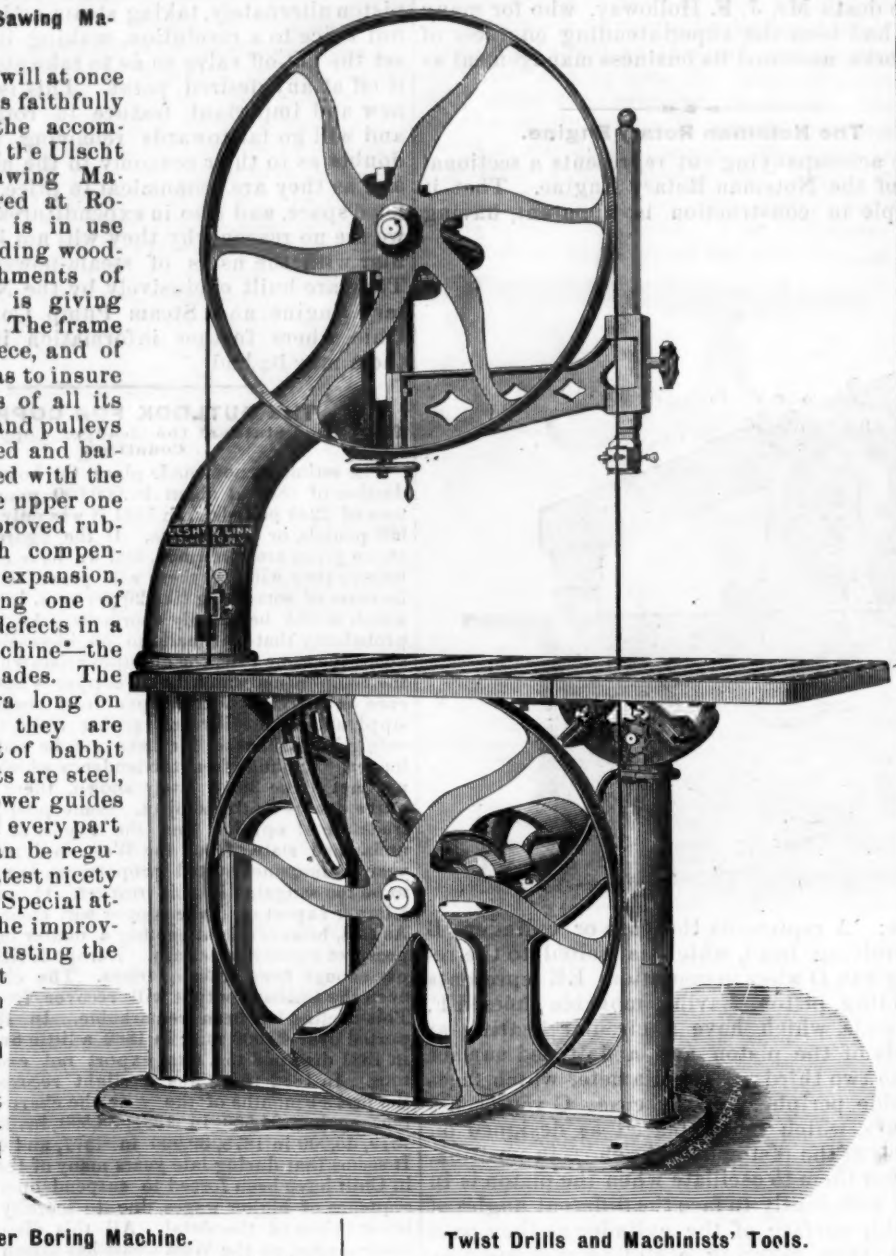
American Trade Journals in England.

Says U. S. Consul Wells, of Dundee, Scotland, in his annual report to the Department of States: United States commercial, scientific, and literary journals are regularly received and kept on file and view at this office; they are valuable in promoting the extension of American commerce, in diffusing commercial and scientific information by their numerous advertisements and general letter-press.

A Superior Band Sawing Machine.

A machine that will at once attract attention is faithfully represented by the accompanying cut. It is the Ulscht & Linn Band Sawing Machine, manufactured at Rochester, N. Y. It is in use in most of the leading woodworking establishments of the country, and is giving great satisfaction. The frame is cast in one piece, and of such proportions as to insure thorough stiffness of all its parts; the wheels and pulleys are carefully turned and balanced, and covered with the best of rubber, the upper one resting on an improved rubber cushion, which compensates promptly for expansion, thereby overcoming one of the most serious defects in a band sawing machine—the breaking of the blades. The bearings are extra long on both shafts, and they are lined with the best of babbit metal. The shafts are steel, the upper and lower guides are adjustable, and every part of the machine can be regulated with the greatest nicety while in motion. Special attention is due to the improved manner of adjusting the table at different angles, which can be done, if so ordered, gradually, and while cutting.

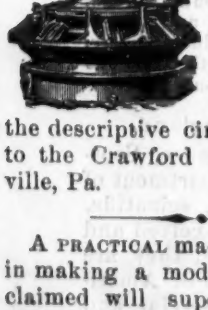
Three different sizes are manufactured—32, 36 and 42 inch.



Cylinder Boring Machine.

An excellent representation is herewith given of the Cylinder Boring Machine, manufactured by the Crawford Iron Works, of Meadville, Pa. The cone pulleys of this machine have four speeds for 4½-inch belt. It is strongly geared, large gear 3 feet in diameter, driving pinions 6 inches diameter; the bar is 9 feet long, 5 inches diameter, parted in the center so as to receive the cylinder. The bar slides through two sleeves 17 inches long, with facers attached. The bearings of the sleeves in boxes, are 11 inches. The outside box can be adjusted to any width cylinder. The cylinder is set with four heavy screws working in two cross-bars, that slide in the bottom of the bed. The cylinder is held to its place by two heavy chains, connected by screws, nuts and straps below, which hold it firmly to its position. A cylinder can be set on this machine in five minutes. It will bore cylinders from 7 to 18 inches in diameter, boring and facing at the same time. It has bored and faced five 9x12 inch cylinders in ten hours, and makes a perfect bore and fine finish.

The Thompson Turbine Water Wheel, also illustrated, has no superior. A large number are in operation. Two styles are made of each size. It can suit large or small streams and high or low heads. The power is guaranteed as represented in circulars. Send for the descriptive circular and price list to the Crawford Iron Works, Meadville, Pa.



A PRACTICAL machinist in this city is engaged in making a model for a locomotive that it is claimed will supersede those now in use.—*Youngstown News-Register.*

Twist Drills and Machinists' Tools.

One of the new and growing industries of Cleveland, is the manufactory of McDermid and & Williamson, Perkins' Power Block. The gentlemen composing this firm are both practical mechanics; indeed, they have designed all their own machinery for the manufacture of their drills, and have lately designed and placed in operation a machine for grinding the clearance on all drills, a feature much desired and actually necessary to insure a good free working drill. They make a specialty of twist drills, taper shank twist drills, straight shank drills by 64ths, and also Stubs' wire gauge, from No. 1 to No. 60; bit stock drills and drills fitting both Coe's blacksmith and the Prentice or Worcester drill presses. They also intend to soon fit up machinery for the purpose of making reamers and milling cutters of all kinds. They have already established a good shipping trade throughout the surrounding States, besides furnishing several local tradesmen. We bespeak for them the liberal patronage of machinists and dealers.

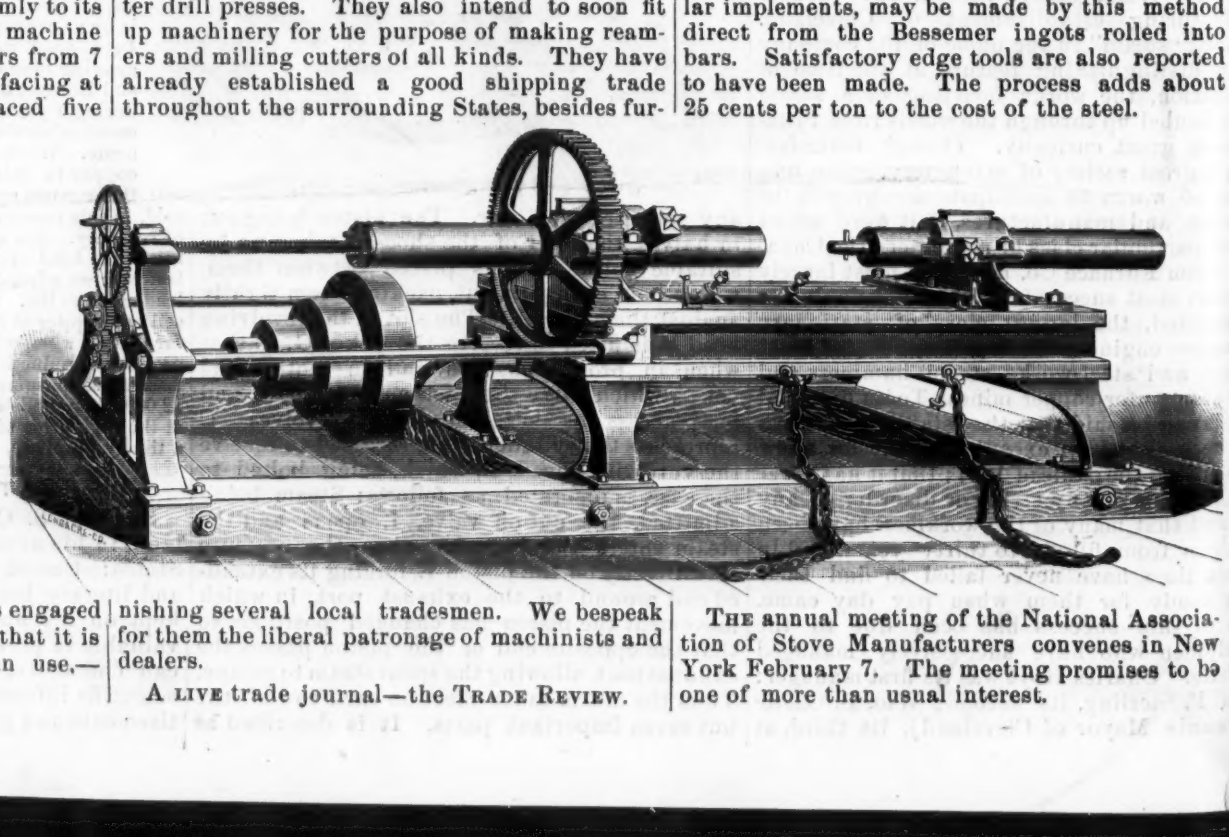
A LIVE trade journal—the TRADE REVIEW.

Cleveland's Wholesale Clothing Trade.

In the wholesale clothing business the well-known firm of Lehman, Richman & Co., 86 and 88 Water street, take a leading rank. Established at Portsmouth, O., over a quarter of a century ago, their business increased to such an extent that, to enlarge their facilities to a size commensurate with their increasing sales over the West, they were compelled to seek a more advantageous location. Such a location they found in Cleveland, furnishing, as it did, more improved machinery and experts in workmanship, a better outlet for trade, a more extended market in all branches of business, and a first-class reputation as a clothing center. Accordingly, about four years ago, this enterprising firm removed here, occupying the spacious Worthington building, their present quarters. Though their sojourn here has been comparatively short, they have secured the confidence of the trade in general, and to-day they rank as one of the leading clothing houses of the State and West. Several recent changes in their traveling force have added strength to this prosperous firm. Among others, they have just perfected arrangements with the well-known clothing traveler, Mr. Wm. Scott, who, through his ten years connection with the house of Warner Bros., Buffalo, is well and favorably known to the trade. In addition, they have also secured an acquisition in Mr. Max Fox, an able and worthy gentleman, thoroughly familiar, from years of experience, with every detail of the business. He has been assigned to Pennsylvania, where he enjoys an extended acquaintance. Finally, we are pleased to learn that the State of Michigan, where Lehman, Richman & Co. have a very large patronage, has been well provided for in the person of Mr. Leo Loeb, who for years has represented one of the largest Chicago firms in that State. With these excellent representatives, in connection with their old, trusted, traveling men, Mr. Sol. Bloch, who has won hosts of friends in the Southern and Southwestern part of Ohio, as well as Mr. Joseph Loeb, who has traveled for years in the Eastern part of Ohio and part of West Virginia, and Mr. E. G. Cohen, who looks after the trade of Indiana, and who has represented this firm for the past five years, the continued success and prosperity of Lehman, Richman & Co. are assured beyond doubt.

A PROVISIONAL committee, with Mr. Charles Boyssett, Vice-President of the French Chamber as President, has been formed for organizing an international exhibition of appliances calculated to insure the safety of railway passengers, to be held in the Palais de l'Industrie, Paris, in 1883. Objects to be admitted are: Systems of coupling, arrangements of signals, and various brakes.

WITH regard to the possibility of welding or hardening Bessemer steel, it is claimed for the patent Siegfried process, that turning tools, picks and bars, drills for rock work, and similar implements, may be made by this method direct from the Bessemer ingots rolled into bars. Satisfactory edge tools are also reported to have been made. The process adds about 25 cents per ton to the cost of the steel.



THE annual meeting of the National Association of Stove Manufacturers convenes in New York February 7. The meeting promises to be one of more than usual interest.

THE BASIC OPEN-HEARTH STEEL PROCESS.

At the Alexandrosky Works, Russia.

Some time since, we gave an account of the results obtained at Creusot, France, in using the basic process in the manufacture of open-hearth steel. Mr. O. T. Tellander has, in a recent issue of the *Jern Kontorets Annaler*, Sweden, given details on the work of at the Alexandrowsky Steel-Works, St. Petersburg, Russia, which are particularly valuable because they give the experience gathered in producing more than 14,000 tons of ingots. The furnaces used are the same employed in the ordinary process, except that the hearth and walls are made of a mixture of dolomite and from 17 to 18 per cent of coal-tar. In rebuilding a furnace, the gas and air-flues are built up in the usual manner with Dinas brick, and upon them the bottom is rammed in torm of of a 7.2 inch layer of dolomite. Then wooden walls are erected parallel to the side walls of the furnace, leaving a space of 18 inches below and 12 inches above. This space is filled with the basic mixture in 2-inch layers; but in order to keep the Dinas brick and the basic mixture from running together, the joint of the two is made of a six-inch layer of a mixture of chrome ore and coal-tar. The roof is borne simply by the furnace casing. It is only touched by the side walls, and is made of Dinas brick as usual. When the furnace is finished, rail ends are laid as closely as possible over the whole of the bottom, and the rammed walls are protected by thin sheet-iron, held in place by struts of rail ends. By this means, the air is kept from the tar, so that it does not burn when the furnace is dried out, before the dolomite is well sintered. It prevents, too, swelling and foliating. The crop ends are allowed to remain in place as long as possible, until they show an inclination to weld together, when they are taken away. Firing is continued until the well sintered mass is hard, which takes 1½ days with gas and 2½ days with wood. Charging is then commenced.

In the beginning of the work, a series of trial charges were made. Now the working appears to have settled down to the following as an average: 35 per cent of Cleveland pig (with 3 to 4 per cent of carbon, 0·70 to 2·20 per cent of silicon, 1·20 to 2·0 per cent of phosphorus, 0·06 to 0.15 per cent of sulphur). 10 per cent of cast scrap (3·50 to 4 C. 0·30 to 1 Si, 0·40 to 1·20 P, and trace to 0·05 S), 10 per cent iron rails (0·25 to 0·65 P, 0·04 to 0·20 S), miscellaneous wrought scrap (0·20 to 0·50 P), 4 per cent own scrap(0·30 to 0·43 C), trace to 0·02 Si, 0·03 to 0·10 P, 0·01 to 0·05 S, 0·4 to 0·8 Mn), 4·5 per cent of hematite pig (3 to 4 C, 0·7 to 1·2 Si, 0·03 to 0·05 P, 10 to 20 Mn), and 0·5 per cent ferro-manganese (5·5 to 6·75 C, 0·08 to 0·15 Si, 0·08 to 0·13 P, 50 to 80 Mn). In order to get cinder which would be sufficiently basic, lime to the extent of about 6 per cent of the total weight of the charge is added from the start. Toward the end of the charge, bricks pressed from a mixture of slacked lime and roll cinder are added, according to requirements. The phosphoric pig is first charged, followed by a layer of lime and as much scrap as the furnace will hold. This first lot generally melts in four hours, and the rest of the scrap is then put in as occasion requires, in lots of 320 kilograms. The level of the melted metal is kept pretty high, so that in the beginning, when the cinder is very fluid, a part of it will flow out of the working door when the charge is boiling. When all the scrap is melted down, and after the cinder is drawn off as thoroughly as possible, the bath is stirred and a sample is taken, which is hammered and broken. If the fracture shows any traces of crystalline structure, 120 pounds of basic bricks, consisting of a mixture of 5 parts by volume of lime, and 4 parts of roll cinder are added, and this is repeated until the desired quality is reached. The metal shows a tendency to rise in the moulds. Repairs of the furnace after every heat, heating up and putting in the cold charge, takes 2 hours 20 minutes, while the time for completing the charge is 9 hours 35 minutes, thus making it possible to make two casts during 24 hours. The basic hearth will stand from 150 to 200 charges, while the roof, walls, and flues must be repaired after from 30 to 40 heats. The time for working in a small 8-ton furnace, is the same as for a large 10-ton furnace; the average product of the works is not therefore as great as it would be if all the furnaces were of the larger size. During the first five months of 1882, six furnaces, working 428 days, and making 854 charges, produced 6081 metric tons of ingots, using 1970 tons of Cleveland pig, 670 tons of cast scrap, 1409 tons of old rails, 2076 tons of miscellaneous scrap, 303 tons of hematite pig, 577 tons of spiegeleisen, and 35 tons of ferromanganese, a total of 7040 tons. The consumption of coal was 5503 tons, and 453 ton of limestone and 120 tons of lime-cinder bricks were used besides. The yield in ingots was 86·4 per cent, and scrap 2·6 per cent, so that the waste was 11 per cent.

The following table gives the chemical composition of the various grades of steel produced, and their physical properties, as revealed by mechanical tests:

CHEMICAL ANALYSES.

GRADE.	MANGANESE.	CARBON.
Rail Steel	0·40 to 0·80	0·30 to 0·45
Hard "	0·30 " 0·50	0·20 " 0·25
Soft "	0·20 " 0·35	0·10 " 0·15
Very Soft Steel	0·20 " 0·30	0·06 " 0·10

GRADE.	SILICON.	PHOSPHORUS.	SULPHUR.
Rail Steel	Trace	0·03 to 0·07	0·01 to 0·03
Hard "	"	0·03 " 0·05	Trace
Soft "	"	0·02 " 0·03	"
Very Soft Steel	"	0·02 " 0·03	"

MECHANICAL TESTS.

GRADE.	TENSILE STRENGTH. LBS. PER SQ. IN.	ELONGATION. PER CENT.
Rail Steel	71,120 to 85,344	15 to 25
Hard "	56,896 " 71,120	20 " 25
Soft "	49,784 " 56,896	25 " 30
Very Soft Steel	42,672 " 49,784	More than 30

The average percentage of phosphorus in the raw material in the charge was 0·50 per cent, thus showing an elimination to the extent of 80 per cent. The most striking fact in the series of analyses is the almost perfect removal of the silicon, so that in this respect the basic open-hearth process does not differ from the Basic Bessemer process.

In conclusion, Mr. Tellander gives some details on the burning of the dolomite. The Alexandrowsky works have four cupolas with a sheet iron shell, 11·48 feet high and 5·73 feet in diameter. At first, these shells were lined with the basic material used for the hearth of the steel furnace, but it was found that this lining would not last. After some experimenting, the best was found to be a lining of chrome ore from the Ural Mountains, containing 8 per cent of silica, 13·5 per cent of oxide of iron, 13 per cent of alumina, 51 per cent of chromic oxide, 1·5 per cent of lime, and 13 per cent of magnesia. The mortar used is a mixture of two parts by volume of the smalls of the ore, and one part by volume of lime. This cupola lining lasts from 3 to 4 months as against 15 days for the dolomite lining. In burning the dolomite, the charges are 560 pounds of dolomite to from 260 to 300 pounds of coke, the yield of a cupola being 6·4 metric tons of burnt dolomite, or 51 per cer cent of the raw rock charged. The burnt dolomite is sorted into three grades, the first being highly burnt and dense. The third grade, in quantity about 25 per cent of the whole, is porous and light, and is used only for patching without admixture of tar.

The capital invested in railroad building during the last year is estimated at $270,000,000, exclusive of the money expended on roadbeds on which tracks have not yet been laid. Of the three hundred and sixteen roads on which the work was done, one hundred and forty are uncompleted, The number of miles of main track laid was 10,821.

The growth of Detroit's commerce during the past two years is illustrated by the returns of the import trade of the leading cities of the country. In 1881 the inland cities ranked, in respect to their direct imports, as follows: Chicago, St. Louis, Cincinnati, Pittsburgh, Buffalo, Cleveland, Detroit, Milwaukee, etc. In 1882 Cleveland and Detroit both passed Buffalo in the race. In 1881 the importations of Buffalo reached $298,732; those of Detroit. $242,198. In 1882, the importations of Detroit footed up to $359,582; those of Buffalo, $334,533. In 1881, Detroit was the seventh among the inland importing cities; she is now the sixth.—*Detroit Journal of Commerce.*

NOVEL HOUSE-WARMING APPARATUS.

Professor E. S. Morse, of the Essex, Mass., Institute, has devised an ingenious arrangement for utilizing the heat in the sun's rays in warming houses. His invention consists of a surface of blackened slate under glass, fixed to the sunny side or sides of a house, with vents in the walls so arranged that the cold air of a room is let out at the bottom of the slate and forced in again at the top by the ascending heat column between the slate and the glass. The out-door air can be admitted, also, if desirable. The thing is simple, and its entire practicableness has been demonstrated, it is said, in the heating of the Professor's study in his cottage at Salem. The value of the improvement for daily warming buildings, like churches and school houses, which, when allowed to get cold between using, consume immense quantities of heat before they are fairly warmed again, is evident. Of course any other means of heating is available when the sun does not shine.—*N. Y. Tribune.*

AMERICAN SOCIETY OF CIVIL ENGINEERS.

The American Society of Civil Engineers met in New York City, January 17th. Several interesting papers were read and discussed. Excursionists were made by the members in a body to places of engineering interest in the city. The following officers were elected for the coming year: President—Charles Paine; Vice-Presidents—William H. Paine and Henry Flad; Secretary and Librarian—John Bogart; Treasurer—J. James R. Croes; Directors—George S. Greene, Jr., Joseph P. Davis, William Metcalf, William E. Merrill and William G. Hamilton. A committee on Uniform Standard Time approved the action of Congress in authorizing the President to summon an international meeting on the subject, and recommended that a convention be called as soon as possible for determining a standard time for North America. It was decided by the society, if, after communication with ather scientific bodies, it was deemed advisable to send a petition to Congress to call such a convention.

UNSOLICTED OPINIONS OF THE "TRADE REVIEW."

One of the best papers of its class.—*Springfield, O., Republic.*

The Cleveland TRADE REVIEW is one of the ablest and most interesting of trade papers, and shows renewed vigor and enterprise with every number.—*Pittsburgh Telegraph.*

THE REVIEW is an able exponent of the industries of Ohio.—*Chicago Industrial World.*

The Cleveland TRADE RENIEW * * * is a worthy representative of the great mechanical and manufacturing interests of this section.—*Akron, Ohio, City Times.*

The TRADE REVIEW has already an established reputation, and under the management of the new and aggressive owners, will become one of the best trade papers in the country.—*St. Louis Age of Steel.*

THE REVIEW has long been recognized as a very efficient organ of the manufacturing interests of Northern Ohio, and we have no doubt that its new proprietors will extend its usefulness and expand its field of operation.—*Philaphia Bulletin.*

The paper is well edited, and is the only strictly manufacturing, industrial and scientific publication issued in Ohio.—*New Castle, Pa., Guardian.*

THE REVIEW has been for years one of the most conscientious and painstaking publications in our somewhat extended circle of exchanges.—*Cincinnati Trade List.*

This publication is rapidly obtaining a reputable place in in the journalism of mechanism.—*Detroit Marine News.*

THE REVIEW is the only strictly manufacturing, industrial and scientific publication in the State of Ohio, and is entitled to a large patronage.—*Meadville, Pa., Republican.*

Business Topics.

THE COST OF STOPPING A TRAIN OF CARS.

The cost of stopping a train of cars, says the *Hartford Courant*, is being guessed at by experts just now in a very interesting way. And it is something worth the inquiry of railroad men, especially in Connecticut, where, besides the stations, there are so many drawbridges at which the safety of the traveling public demands full stops. Estimates of the cost have ranged from one-quarter of a cent up to $2 for stopping an ordinary passenger train. The small figure represented only the estimated loss of metal by applying the brake to the wheel. Some of the real considerations that go to make up the cost of a stop are the coal burned while the train is standing still and in order to resume the former speed. This the Pennsylvania railroad people put at twelve to fifteen cents; then there are the wages of all the persons on the train, who, while the train slows down and stops are paid as if they were running. This is insignificant in the case of one person, but it amounts to something when the whole train force is considered; besides these there is the wear of rails. A rail lasts only a third as long where trains come to a stop on it as when merely run over. This is the result of the action of the brakes. Then, too, more accidents occur to engines, to wheels, and axles in coming to a stop or in starting again than when running right along. The *Railroad Gazette* reports a discussion on this subject, in which the conclusion is reached that the actual cost of stopping an ordinary train is about from thirty to sixty cents. An amusing story is told of a trial where experts testified that it cost $2 to stop a train. They established the fact. Then the counsel on the other side produced the company's time table, with a full list of all the stops, including stations, took the total number of its trains, calculated the total stoppages of all the trains for one year, multiplied the result by $2—the experts' estimate of cost—and demonstrated that the stoppages alone had, if the estimate was right, cost the company three times as much as the entire amount of its operating expenses for the year. This reduction to a solid basis of fact upset the $2 theory effectually.

THE PENNSYLVANIA STEEL COMPANY'S PLANT.

The Pennsylvania Steel Company, the works of which are at Steelton, near Harrisburg, is completing a school building at a cost of $65-000, which will be presented to that borough, The company is also erecting a merchant plate mill at a cost of $300,000, a blacksmith shop to cost $65,000, two new furnaces to cost $400,000, and just completed 120 dwellings at a cost of $60,000. The company pay 6 per cent. in dividends semi-annually, employs 2500 hands, and has a monthly pay-roll approximating $130,000. Its freight bills this year will be $800,000, and of this the Pennsylvania Company will receive $600,000. One steel rail 30 feet long is made in these mills every passing minute of the day and night. One hundred cars arrive and depart every twenty-four hours, and there is never a smaller amount than $1,000,000 worth of raw material at any time.

CONSOLIDATING THA HOCKING VALLEY INTERESTS.

A Columbus dispatch,Thursday evening, gives the following additional particulars of an important consolidation referred to elsewhere in this issue: "J. R. Buchtel, J. A. Long and Lewis Miller, of Akron; — Ferguson, of Gore; Colonel Samuel Churchill, General Samuel Thomas, I. I. Longstreet and Walter Crafts, of Columbus, met this night in the office of Churchill, Thomas & Co., and nearly completed the consolidation of the furnace and coal property owned by the gentlemen named above. The amount of property that was transferred up to midnight is valued at nearly $3,000,000. The capital stock of the company, which will be known as the Columbus & Hocking Coal and Iron Company, will be $5,000,000, in shares of $100. General Samuel Thomas will be president of the company, and there will be a manager for the coal interests at well as one for the iron interest. A few more details are to be arranged, when the certificate of incorporation are to be filed.

PIG IRON PRODUCT OF GREAT BRITAIN.

In its annual review of the Britsh Iron Trade, the London *Iron Trade Journal* says: The total make of pig iron in the United Kingdom for the half year ending June 30th was 4,241,245 tons, a decrease of about 8,000 tons on the corresponding period of 1881. The number of furnaces in blast on January 1st was 552; February 1st, 565; March 1st, 575; April 1st, 577; May 1st, 372; June 1st, 566; July 1st, 563; August 1st, 563; September 1st, 569; November 1st, 571; December 1st, 566; December, 31st, 557; so that in the first half of the year the average number of furnaces working was 568 aginst 556 in the second half of the year. With a decrease of nearly 100,000 tons on the West Coast, and 50,000 tons in Scotland, it may be inferred that when the actual returns for the year are forthcoming they will show, if any, but a slight increase on the production of 1881, which was 8,377,364 tons. The production in Lanca shire, Lincolnshire, Derbyshire, Nottinghamshire, North Staffordshire, and South Wales, will probably show an increase, which will be counterbalanced by decreased production in other districts. The stocks of pig iron at the end of 1881 exceeded one and three-quarter million tons. At the end of 1882 we estimate the stock at about 1,300,000 tons.

THE NEW LUMBER DUTIES.

Important Changes in Tariff Voted by the Senate.

New York Tribune.

The vote on the lumber duties in the Senate on Monday was more important than the amount of duty now collected from lumber would indicate. It was at first proposed to put all articles of the Wood schedule into the free list. By an amendment finally adopted, timber hewn and sawed, timber not specially enumerated, boards, planks, deals and other sawed lumber, laths, shingles, and pine and spruce clapboards, were put into the free list, leaving the present duty to stand upon manufacturers of wood and other articles of the Wood schedule. The duties collected during the fiscal year ended June 30, 1882, on all the articles which the Senate voted to put into the free list were $1,110,658.53, while the duties collected on all other articles of the schedule were $476,291.99. In the vote, Messrs. Van Wyck, of Nebraska, McDill, of Iowa, and Ingalls and Plumb, of Kansas, were the only Republicans who, with Mr. Mahone, of Virginia, and twenty Democrats, voted for the amendment. Against it were twenty-two Republicans and Mr. George, of Missippi. A clause affecting only $1,100,000 of the revenue, and importations of 258,337 cubic feet of timber, 549,547 M feet of lumber, 163,085 M of lath and 99,154 M of shingles, would not be very important if that were the end of it. These were the quantities actually imported last year, and they represent an insignificant part of the total consumption in this country, the receipts at a single city being nearly four times as much, and the total consumption about thirty-eight times as much.

But this item illustrates the utter impossibility of determining the effect of a change in the tariff by means of past importations only. It often happens that even the best experts in the country can form no idea how large the imports would be if even a moderate duty were removed. The imports last year of unplaned boards of hemlock, whitewood, sycamore or basswood were 46,845 M feet, and of other unplaned boards 496,004 M feet. The average value of the first-class was about $9, and the duty about 11 per cent; the value of the second and largest class was about $12, and the duty 16 per cent. No one can tell how large an increase of importations might result from a removal of the duty of $2 per M feet, nor whether it would materially lower the cost to consumers or merely enable Canadians to get higher prices. The Western Senators who insist upon a removal of the duty, in order that their constituents upon the treeless plains may get cheaper lumber for building, are doubtless aware that nearly all the importations at present are at Vermont, Champlain, Oswego, Oswegatchie and Buffalo; in fact, out of 575,000 M feet imported in 1881, no less than 409,442 M feet were imported at ports in this State, and 134,288 M feet at Vermont. Apparently this market would be affected almost exclusively, but the belief is that large imports would be made at the West if the obstacle presented by the present small duty should be removed, and that the price at Chicago and other Western markets would thus be reduced. The increased importation, moreover, is counted upon to retard the exhaustion of timber lands in this country, and thus to prevent a period of extortionate prices which, it is believed, must speedily come if the destruction of our forests continues at the present rate.

The position taken by the lumber producers is substantially this: that the destruction of forests is inevitable, and will go on in any case—more rapidly by fire than by the axe. They hold that the removal of the duty would only enable Canadian producers to charge a higher price, and point to experience under the Reciprocity Treaty as supporting this claim. If consumers at the West are to gain nothing of consequence, the demand in this country being so far in excess of the possible supply from Canada as to control the price, the question is whether it is well to confer a benefit upon Canadian producers to the detriment of our own. The argument would be strong if it were quite clear that the destruction of forests cannot be materially retarded by drawing more largely from the Canadian supply. But the advance in price has been large of late years. It was testified before the Commission by dealers in Chicago that the average has risen from $9.63 for the three years 1877, 1878 and 1879, to $11.63 in 1880, $13.92 in 1881, and over $14 in 1882. If this advance is justified by the rapid exhaustion of timber lands, then we may as well begin to draw upon Canadian supplies at once, for we shall have to do so in a very few years at any rate. If the rise in prices is not the result of actual exhaustion, but of a virtual combination of men who control timber lands, then it is by no means clear that free excesses to Canadian supplies would not benefit consumers.

The object of the protective system is to protect American labor. It was never intended to confer upon the capitalists who get control of certain tracts of land the power to get a high price for them. It seems to be the fact that timber lands available for Western markets are being rapidly stripped, so that the exaction of a very high price for lumber has become possible. Meanwhile, the faster those lands are exhausted, the sooner the lumbermen will cease to be protected by any tariff whatever, and will find themselves out of work. It is hardly a feature of our intelligent protective system to hasten that consummation.

RAPID PURIFICATION OF SEWAGE.

An instrument which is said to solve the sewage question has been devised by L. Mowras, and was described in a recent number of the *Chemical News*. It is closed with a water joint and is said to be inodorous, and to render infection impossible. It is called a "vidangeuse." "By a mysterious operation, which reveals a totally new principle, it transforms all the solid and liquid excreta which it receives, in a short time, and without the addition of any chemical agents, into a homogeneous liquid, scarcely turbid or colored, and almost inodorous, holding everything in suspension in the state of filaments or granules almost invisible." The effluent which contains all the elements of the excreta, organic or inorganic, may be used for irrigation. Experiments made with a vidangeuse with glass sides are said to have proved that fæcal matters introduced along with urine, soap suds, etc., are completely reduced at the end of twenty-five days (?). Light substances, such as paper, after having floated for a certain time, finally disappear and are dissolved in the liquid mass. A bladder adapted by means of a tube above the experimental vidangeuse does not swell out, but shrinks, showing that instead of liberation of gases there is absorption.

Shop Notes.

MENTAL TRAINING IN SHOPS

[Frank H. Richards in American Machinist.]

There are considerations other than merely technical ones which have weight in determining the quality and quantity of a man's work in the shop. For instance, what is distinctly and pre-eminently the mark of the superior workman? I would unhesitatingly put it as self-respect. The good workman *justly* appreciates his abilities; and his self-appreciation is as far as can be from unwarranted and inordinate self-conceit. A man in a machine shop, like a man anywhere else in life, who knows how to do good work, knows well enough when he does good work, knows as well as anyone the value of it, and cannot be got willingly to waste it. Work that is wasted is never good work nor done by a good workman. Work may be like choice butter upon good bread, or it may be like the same butter daubed upon the sleeve of your best coat, and then it is not good work. Troy is the great laundry city—put tight fits upon work that is to encounter the rust of a wash-room, and it will bring you profanity instead of praise. The most worthless man in the shop is he who is willing to swing his axe all day and see no chips fly. The man who is in earnest makes every motion tell to the accomplishment of his purpose. He is the man whom I may safely tell when anything about his work is wrong. He will know that he is precisely the one who should know about it, that he may correct it and avoid a like mistake in the future.

The tool-acquiring instinct is an almost unfailing mark of the good machinist, and the lack of it in a young one is a fatal and hopeless symptom. By the term tools we must cover far more than the rule, square, calipers, and articles of that character. Whatever will facilitate the work entered into may be called tools, all the training of eye and brain, as well as that of the hand, the seeing and thinking which precede the skillful doing, the planning of means and methods in advance of the moment of execution. Among valuable facilities to a man may be reckoned a knowledge of all the dimensions and movements of the lathe or other machine he operates. I have seen a manwho has run a certain planer for 10 years, and who does not to-day know how far a turn of the crank will raise is cross-head, and when making a change he usually has to stop and apply his rule two or three times before he gets to the right height. Another has to run a drill a certain distance into a piece that he has in his lathe chuck, and to make sure, he gets a file and cuts a notch in the drill, instead of knowing the pitch of the tail screw and counting the turns of it, which would do the work with greater accuracy. I verily believe that I am disposed to be kind and helpful, and am not lacking in patience, but I have very little of it to waste upon the fellow "learning the trade" who expects to be told every detail of it. He won't have the trade learned in a hundred years. Only a week or two ago I scolded as sharply as I knew how a young man who had been in the shop three years, and did not know how to adjust the stroke of a shaper. "Nobody ever showed him how;" why, nobody ever showed me how, and he had as good facilities for learning the matter as I had. I mention this with impunity, as he is not of those who read the AMERICAN MACHINIST.

The trade becomes continually less and less manual. There is less pushing the file and swinging the hammer. Muscle is at a discount and brains are above par. One who expects to become a machinist without mental training had better step out, One is never learning anything unless he is in trouble. If I got hold of a bright and ambitious young man and wanted to push him, I would keep him in hot water all the time. There is a power of virtue in hot water.

Akin to the tool-acquiring is the tool preserving instinct., of which I want to speak more fully than I can at the end of this. It is a great point to have tools always in order, always in a place and in a handy place, everything not wanted out of the way, and ones surroundings roomy and comfortable. We rise by opportunities, and they are few and far apart, and he whom the opportunity finds equipped and alert is the one to mount and master it.

IRON CEMENTS.

The *Technische Commerz Zeitung* gives the following receipts for cements for iron:

Black Iron Cement for Iron Ovens.—Iron filings, 10 parts; sand, 12; bone-black, 10; slaked lime, 12; lime milk, 5.

Cement for Objects which have to be Heated.—Iron filings, 100 parts; clay, 50; common salt, 10; quartz sand, 20.

Cement for Fastening Iron to Stone.—Fine iron filings, 10 parts; plaster of Paris, 30; sal-ammonniac, ½. These are mixed to a fluid paste with weak vinegar, and used at once.

Cement for Iron Cisterns.—Finest iron filings are mixed with vinegar into a paste, which is left to stand until it becomes brown; the mass is then pressed into the joints.

Fire-proof Cement for Iron Pipes.—Wrought iron filings, 45 parts; clay, 20; china clay, 15; common salt solutions, 8. If china clay cannot be found fire-clay will serve the purpose instead.

Ammonia Iron Cement.—Iron filings, 100 parts; sal-ammoniac, 2; water, 10. This cement begins to rust after some days and becomes very strong, and is proof against water and steam.

Cement for Annealing Boxes.—Iron filings, 100 parts; lime milk, 40; quartz sand, 50; vinegar, 20. These are worked with water into paste, to which may be added, to render the mass more porous, hair, sawdust, etc.

Iron Cement for Hermetically Closing Stove Doors.—Finest iron filings, 100 parts; sal-ammoniac, 10; limestone, 10; soluble glass solution, 10. These are mixed with water to a thick paste, which is applied at once, and is left to dry slowly before heating.

Cement for Broken Iron Vessels.—Iron filings, 10 parts; clay, 60. These are worked with linseed oil into a thick paste, which is applied after some mote linseed oil has been added to it, and left to dry slowly.

Rust Cement for Iron.—Wrought iron filings, 65 parts; sal-ammoniac, 2½; sulphur (flowers), 1½; sulphuric acid, 1. The solid ingredients are mixed dry, sulphuric acid diluted with sufficient water being then added. This cement dries after two or three days and unites with the iron, making a very resisting and solid mass.

Cement for Filling Faults in Castings.—Iron filings, free from rust, 10 parts; sulphur, ½; sal-ammoniac, 0-8. These are mixed with water to a thick paste, which is rammed into the "faults." This becomes strong when the iron filings are rusted. The parts which have to be cemented are treated before the operation with liquid ammonia, so as to be perfectly free from grease.

BENDING COPPER TUBES.

For bending copper tubes the almost universal practice is to fill the tubes with lead or resin, then bend them round a chuck, or something of the same radius, as that required for the bend. The lead or resin may then be melted out. A machinist at Philadelphia, some years ago, devised an ingenious apparatus for this purpose, which, however, has not come into general use. It consists of a flexible mandrel of steel, made of wire of square cross-section, and with the coils lying in contact so as to form a close spiral. By inserting one of these of the right diameter into the tube, it can be bent to any angie without wrinkling. When properly bent, the mandrel can be readily withdrawn by simply taking hold of one end of it and drawing on it, giving it, at the same time, a slight twist to lessen its diameter. At the time this invention was first brought out, it was said to answer the purpose very well.

MECHANICS WRITING FOR TRADE PAPERS.

"Foundryman," writing to the *American Machinist*, says: A mechanic said to me: "Some of those center reamers illustrated in the *American Machinist* are worthless."

"Does it advise the use of that kind?" I asked.

"Why, no."

"Well, now, my friend," I remarked, "you know what a good center reamer is, and how to use one. Sit right down and sketch out your idea of the *ne plus ultra;* state your reasons, send to the editor, and you will get an audience of several thousand. You can do yourself credit and do others good. If you have got something that is ahead of present practice in this respect, let it out. It won't injure you; it will help you. It won't injure others; it will help them. If you have got something that yon have been deceiving yourself with, some of the boys will satisfy you where you were wrong. In any event everybody will be better for the exchange of opinions."

ZINC IN BOILERS.

The author finds that a battery is formed by the iron and zinc, which occasions a continuous decomposition of water. The oxygen combines with the zinc, and the zinc oxide combines with fatty acids present in the feed water, fotming a zinc soap, which prevents the adhesion of saline matter to the sides and plates of the boiler. The hydrogen prevents the danger of explosion from the absence of gaseous matter, and consequent superheating. When a boiler has been kept for a considerable time with its fire banked up, the hot water is totally deprived of air, and on then raising the heat an explosion is possible. In such cases he recommends that a part of the water should be run off and fresh water containing air introduced in its stead.—*M. Treve.*

POWER REQUIRED TO SHEAR HOT STEEL BLOOMS.

Writing to Stahl und Eisen Mr. R. Lauenstein, assistant chief engineer of the North Chicago Rolling Mill Company, gives calculation of the power required to shear hot steel blooms to length for a 30-foot rail. The shear at the works named is driven by a 10x16 horizontal engine geared 1 to 4½, the stroke of the shears being 9 inches and the dimensions of the blooms 6¾ inches square. When the engine was running at a speed of forty-five revolutions, the power is just sufficient to cut the blooms, tho speed of the fly wheel being sensibly affected. When the blooms were not quite hot enough, the engine stopped without entirely cutting through the bloom. This, therefore, proved to be the minimum limit of speed. From this, Mr. Lauenstein calculates that the entire pressure upon the cutting tool of the shears was 125,120 pounds, or or 2,746 pounds per square inch of the bloom to be cut.

PARAFFINE OIL IN GAS MAKING.

At the last meeting of German Societies of Gas and Water Works Engineers, at Hanover, a discussion took place on Riebeck's system of impregnating coal with paraffine oil previous to its use in gas retorts. The general result of the discussion was that the system was inapplicable and of no advantage where good gas coal is employed, but of use where inferior coal, lignite, or other substances are used for gas making, which give gas of low luminosity or of a dark colored flame, when the addition of paraffine oil increases the illuminosity and renders the flame white. At Ratibor, in Silesia, the ordinary gas having only 12 to 14 candle power, was brought easily up to 16 candles by the addition of paraffine oil. Mixed with small slack, which is left to lie some time in order fully to absorb the oil, the latter is stated to produce a quick distillation of the coal gas and better coke.

The National Association of Stationary Engineers is rapidly extending its membership. Recently a local Association was established at St. Paul, Minn., and others are about to start in Hartford, Conn., Culumbus, O., and probably San Francisco, Cal. The President, Henry Cozens, writes: "We will no doubt, before long. enroll every State in the Union."

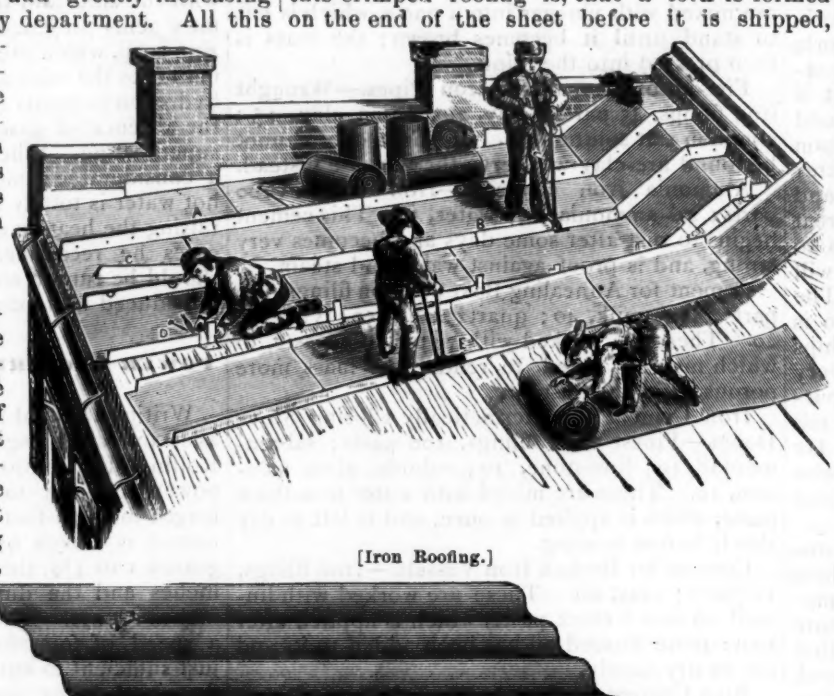
The December report of the Bureau of Ariculture places the wheat yield of the United States at 502,739,600 bushels, against 380,280,080 in 1881, and 459,479,500 in 1879. Ohio produced within less than one million of bushels as much wheat as the Pacific States, her product being 45,453,600 bushels. There is a small increase of area in winter sown wheat, which in the Middle States is reported in good condition, fairly good through the South, and up to the usual standard of good quality throughont the West.

The Garry Iron Roofing Co.

The removal of the Garry Iron Roofing Co., of Cleveland, to their new and commodious buildings, occupying 100 feet on Merwin and British streets respectively, renders appropriate some reference to this growing establishment and the products for which it is justly famed. Starting in 18[illegible] their business has extended so rapidly that it now reaches, literally, from "sea to sea," orders having been filled for Maine, Louisiana, Utah, Oregon, New York, Ontario, Manitoba, and other representative points. With the present removal, necessitated by the rapid and substantial growth of their business, they are adding new machinery and greatly increasing their facilities in every department. All this is the fruit of wise management and the persistent pushing of the claims of their iron roofing upon the attention of the public, no less than the decided merits of the patent which they own.

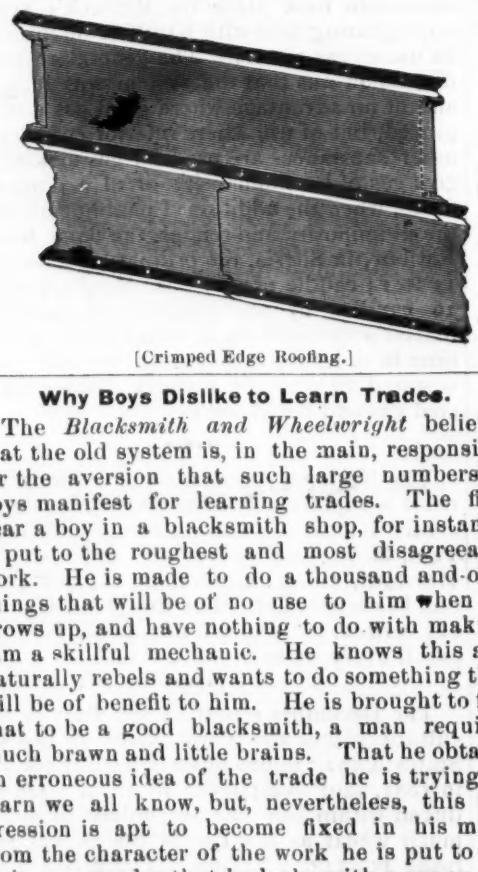
IRON ROOFING.

The points of superiority upon which the Garry Iron Roofing especially appeals to the favorable judgment of practical men are: That by this patent the nailing or screwing of the joints is avoided; that the method of attaching the roof to the anchors, though perfectly secure, does not interfere with expansion or contraction; that the upright joints, capped and riveted, with the roof firmly flashed to the side walls, becomes self-sustaining; that buildings roofed with iron are insured at lower rates than those covered by any other material; that iron roofs are an absolute protection from lightning and wind, and that the cap-oofing is shipped in rolls, thus effecting a saving in boxing, and avoiding the breaking of the locks and flattening the edges.



[Iron Roofing.]

[Corrugated Iron.]



[Crimped Edge Roofing.]

CORRUGATED IRON.

Their corrugated iron is especially designed for ceilings in churches, halls, stores, etc.; also siding and roofing for all classes of buildings, more especially mills, factories, grain elevators, and foundries. It makes a durable, economical, beautiful and fire-proof covering.

CRIMPED EDGE ROOFING AND SIDING.

This roofing is designed for a cheap class of buildings, such as rolling mills, furnaces, cotton sheds, barns, awnings, &c. It can be laid upon sheeting boards, cross strips, or rafters without sheeting boards. The advantage of this crimped roofing is, that a lock is formed on the end of the sheet before it is shipped, which makes it much better than lapping the end or forming the locks on the roof. It can be laid without the use of the three-sided wood strip (V strip) or without forming the rafter to fit the crimp—thus saving expense of the wood strip. It also can be used as siding for wooden buildings. Their roofing is all thoroughly coated on both sides with the iron ore paint before being shipped. The gentleman connected with the company are all energetic and thoroughly alive to the wants of the trade.

Why Boys Dislike to Learn Trades.

The *Blacksmith and Wheelwright* believes that the old system is, in the main, responsible for the aversion that such large numbers of boys manifest for learning trades. The first year a boy in a blacksmith shop, for instance, is put to the roughest and most disagreeable work. He is made to do a thousand and-one things that will be of no use to him when he grows up, and have nothing to do with making him a skillful mechanic. He knows this and naturally rebels and wants to do something that will be of benefit to him. He is brought to feel that to be a good blacksmith, a man requires much brawn and little brains. That he obtains an erroneous idea of the trade he is trying to learn we all know, but, nevertheless, this impression is apt to become fixed in his mind from the character of the work he is put to do. Is it any wonder that he looks with envy on the boy behind a counter or in a lawyer's office, and longs to get away from an employment which has become irksome?

MECHANICS should take the REVIEW.

Tree Planting by Railway Companies.

Tree planting by railway companies formed the subject of an interesting paper recently read at the American Forestry congress, at Montreal, by Professor Hough. It was stated that since there were in the United States about 100,000 miles of railway, the advisability of tree planting by railway companies for construction and maintenance, was an important question, from 2,000 to 3,000, and even 3,500 ties being used in a mile of rails. The average duration of ties is from five to eight years, and consequently from 30,000,000 to 50,000,000 a year will be required for 100,000 miles of railway. Putting 500 as the product of an acre of woodland, from 60,000 to 100,000 will have to be cut every year, and as it takes thirty years for a tree to grow to the right size, the railways will require from 2,000,000 to 3,000 acres (or 3,126 to 4,687 square miles) of forest to keep up the supply.

THE Commissioner of Agriculture, Dr. Loring, will not get the appropriation he wants to continue his experiments with sorghum, the House committee have nonconcurred in the Senate proposition to give it to him. Members of the House say that, as Loring has announced that the sorghum industry had passed the experimental stage, there is, therefore, no further need of experiments.

The Markets.

[Our quotations represent prices of large lots from first hands, so far as practicable. In filling small orders, higher prices are charged.]

OFFICE OF TRADE REVIEW AND WESTERN MACHINIST.
FRIDAY EVENING, January 26.

IRON ORE.

The only change to report in the ore market is the fact that stocks on dock are getting somewhat lower, but there is enough to supply all demands for those of the best grades. Few if any contracts have been made as yet, furnace men still manifesting a disposition to hold off on orders rather than betray an anxiety to place them, as is usual at this season of the year. The consequence is that the ore market is flat, and will remain so until prices are fixed by the ore companies. Some small contracts have been made to run till the opening of navigation, at prices to be made hereafter, but there is not much doing at the best. We continue to quote nominal figures, as follows:

No. 1 Specular and magnetic Bessemer Ores per ton	$9.25@$10.50
No. 1 Specular (non-Bessemer) ores per ton	9.00@ 9.25
Bessemer Hematite	6.50@ 7.00
Non-Bessemer Hematite	5.50@ 6.00

IRON.

Caution still prevails in all directions. A fair amount of activity has been felt here in many branches of the trade, though prices rule lower. In pig iron there is a growing disposition of consumers to demand, and dealers to refuse concessions, the latter claiming that prices are now below actual cost. Furnace men complain of slackness of orders and threaten to blow out if there is not soon a change for the better. The uncertainty as to tariff legislation overshadows everything. Some sales of flat bar are reported at $2.10, though the general market is $2.20. Inquiries are good and the prospects quite encouraging, but at close margins. There is not much demand for structural irons as yet, but the season is early. Stocks of merchant irons are large and increasing. There is no inquiry for steel rails, but the nominal quotation of $44 is still held to. Old steel rails are dull at $20; $19.50 bid. Old iron rails are a shade firmer. There is no change in scrap. We still quote:

CHARCOAL PIG IRON.

No. 1 Lake Superior charcoal	$26.00@28.00
No. 2 Lake Superior charcoal	26.00@28.00
Nos. 3 and 4 Lake Superior	27.00@30.00
Nos. 5 and 6 Lake Superior	26.00@29.00
Nos. 1, 2, 3, 4, 5, Salisbury	37.00@40.00
Nos. 1, 2, 3, 4, 5, Tennessee, cold blast	35.00@38.00

BITUMINOUS AND COKE IRON.

No. 1 foundry, all lake ores	$23.50@24.00
No. 2 same	23.00@23.50
No. 1 foundry, lake ores, with cinder mixture	22.00@23.00
No. 2 same	22.50@23.00
No. 1 foundry, native Ohio ores	23.00
No. 2 same	22.50
No. 1 silvery, native Ohio ores	22.50
No. 2 same	21.00
No. 1 gray forge, red short	23.00
No. 1 gray forge, neutral	22.00

CINCINNATI (reported by Rogers, Brown & Co.)—There has been some activity in the market the past week, buyers in a few instances coming to an understanding with holders on round lots. The run of small orders continues steadily at prices within the range quoted. Furnace production is being very considerably decreased in all districts tributary to Cincinnati. News comes almost every day of furnaces blowing out or deciding upon that course in the near future. This is true more of charcoal than of coke and stonecoal furnaces, but the latter also are beginning to succumb to the pressure in some quarters. The only element in the situation appearing to cause distrust and apprehension is the delay and uncertainty in tariff legislation. We quote for cash: Hot Blast Foundry.—Hanging Rock, C. C., No. 1, $24.50 @ $25.00; Hanging Rock, C. C., No. 2, $23.00@$24.00; Southern No. 1, $23.00 @ $24.00; Strong Coke No. 1, $22.50@$23.50; Strong Coke No. 2, $21.50@$22.00; Strong Coke No. 3, $20.50@$21.00; Soft Stone Coal No. 1, $22.00 @22.50; Soft Stone Coal No. 2, $20.50 @ $21.50. Forge—Strong Neutral No. 1 Mill, $19 50 @ $20.00; Cold Short No. 1 Mill, $19.00@$20.00. Car Wheel and Malleable—Hanging Rock C. B., $31@$33; Hanging Rock W.B., $25.00@$27.00; Southern Car Wheel Iron, $28.00@$29.00; Lake Superior Car Wheel Iron, $26@$27; Lake Superior Malleable, $26@$27.

HARDWARE.

Whatever the experience of other markets, the hardware trade in Cleveland shows some very encouraging features. There is a growing demand for all kinds of hardware, and shelf goods in particular are moving off rapidly. Inquiries for nails of standard sizes are numerous, but sales are restricted by wholesale dealers to less than carload lots. The prices fixed by the Western Nail Association still prevail—$3.40 60 days, 2 per cent off for cash, with the usual abatement of 10 cents per keg on carload lots and upward—but another week will probably see a rise in the price.

COAL.

The coal situation still remains unsettled, but another step toward a settlement of difficulties was taken by the adoption, at a meeting of Tuscarawas Valley operators held in this city Thursday, of a resolution: "That we accept the report of the committee which recently had a conference with the miners. That eighty-five cents shall be the price of mining in the Tuscarawas Valley on and after the first day of February next. That the said committee be given full power to make arrangements for arbitrating the difference in the price of mining as between the Tuscarawas district and the Hocking Valley district. Said arbitration to take place not later than the 25th day of February next." The final action of the miners remains yet to be taken, and meanwhile present rates remain stationary.

LUMBER.

There is a fair winter trade, with no change in prices. Buyers, however, are holding off in anticipation of lower prices, on account of the fine season for logging, but local dealers say that there is no reason to drop rates and that they will be maintained. There is more planning for building than ever before, and the outlook is consequently quite encouraging. Hardwoods are dull. The putting on the free list by the Senate of timber hewn and sawed, timber not specially enumerated, boards, planks, deals and other lumber, laths, shingles, and pine and spruce clapboards may have an important bearing on the market.

CLEVELAND LUMBER MARKET.

PLANK—2 INCH—MIXED WIDTHS—A 1&2, $50; A 3, $40, B $32, C $30, D $14, E $12. 1¼ and 1½ inch—A 1&2, $48, A 3, $40, B $32, C $20. D $15, E $13.

BOARDS—1 INCH—MIXED WIDTHS—A 1&2, $44, A $36, B $30, C $19, L $14, E $12.

STOCK BOARDS—12 INCHES WIDE—A 1&2, $45, A 3, $38, B $32, C $21, D $16.

STRIPS—6 INCHES—A 1&2, $42, B $32, C $22, D $16, E $12.

WORKED LUMBER—FLOORING—A 3, $42, B $35, C $24, D $20.
Norway Flooring. A 3, $28, B $22, C $18.
Matched Drop Siding 6 in. A 3, $42, B $38, C $24, D $20.
Beaded Ceiling $2 higher than flooring.
One-half inch bevel siding. A 1&2, $21, A 3, $20, B $18.
Ash flooring. A 1&2, $40.

BILLSTUFF—Small, 16 feet and under, $14; 20 feet and over, $4@6 less than length.

SHINGLES, LATH, AND MILL WORK.

Shingles XXX 18 inch	$4 25
Shingles, clear butts	3 25
Lath	2 75@3 00

Surfacing one side, $1.00; 2 sides, $1.50.
Making, flooring and drop sidings, $2.25.

Cleveland Wholesale Prices.

HARDWARE.

Adzes.

Carpenter's.....per doz $18 40
Ship..... " " 18 75
Heavy railroad.. " " 19 50

Axes.

per doz.
Hunt's..... $ 9 50
Lippincott's Crown..... 9 00
Cut More..... 9 00
Peck's Double Bit..... 22 00
"Champion Blade..... 11 00

Anvils.

per lb.
Eagle, Amer.....10c dis 20
Wright's.....10¼c@11c
Armitage's Mouse Hole.....9¼c@9¾c
Trento..... 10¾c
Wilkinson's..... 10½c

Anvil Vise and Drill.

Millers Falls Co, $28.....dis 20
Cheney Anvil and Vise dis25&2

Vises.

Solid Box, list of July 1, '79.....dis 35
Solid "Crown" (A. H. Hildick).....40 to 100 lb, 15c net
Solid, Peter Wright's.....15½
Solid, Wilkinson's.....13½
Parallel, Parker's.....dis 40
Saw Filers, Hopkins' ℔ doz $17.50, dis 10
Reading.....dis 45&10
Lowell Hand Vises.....dis 20
Richardson's Vise and Anvil.....dis 25

Augurs and Bits.

C S cut augers.....dis 40&10
do do do bits.....40&10
D C gimlet do Ives..dis 50
Snells bits.....dis 40
Russell Jennings' augers, dis 16⅔ &10&10&10
Cook's pat augur.....40&10

Animal Pokes.

Berea, per doz..... 4 00
Eagle, per doz..... 5 00

Apple Parers.

Domestic & Reading ℔ doz. $7 50
Turn Table..... 5 00

Bolts.

Machine.....dis 60
Plow.....dis 50
Plow, R. B. & W.....dis 40
Cast Iron Barrel Shutter, etc.....dis 50&10
Cast Iron Chain (Sargent' list).....dis 60&10
Ives' Pat. Door Bolts..dis 50
Wrought Barrel.....dis 55&10
Wrought Square.....dis 55&10
Wr'g't Shut'r, all iron, Stanley's list.....dis 50&10
Tire. R. B. & W., new list.....dis 70&10
Stove, American Screw Co.'s.....dis 40
Bolt Ends 16c. per lb. net... 60

Bellows.

Dis
Bl'ksmith's com new list, 45 ℔ ct
Moulder's new list, dis 25 ℔ ct
Hand, new list, 25 per cent

Butts.

Dis
Wrought brass.....65&10
Cast, loose joint....55&10
Pin, loose.....50&10
Wrought, fast joint narrow.....45&10
Wrought fast joint broad.....45&10
Wrought loose joint broad.....55&10
Wrought table and back flaps.....45&10
Loose joint, without acorns.....55&10
Ten per ct. extra dis for cash.

Cleveland Stamped Elbows

Genuine Russia Iron

4½inch, per doz..... 5 50
5 do do 7 50
6 do do 9 50
7 do do 11 00

Planished Amer. Russia Iron

7½inch per doz..... 5 00
4 do do 6 50
5 do do 8 50
6 do do 8 50

Charcoal Iron

4½inch, per doz..... 2 50
5 do do 3 50
6 do do 4 25
7 do do 5 50
Discount 33⅓ per cent

Chisels.

Hot and cold cutting...℔ lb 30
Railroad track..... 30
Machinists..... 30
Mallet head..... 50
Cape..... 50
Packing..... 50
Stone cutters..... 50

Crowbars.

Cast steel.....℔ lb 8½
Iron, steel points..... 6½c

Cutlery, Pocket and Table.

Meriden Cutlery Co., table net
Am. Miller Bros.' Cutlery Co.....dis 25
Humason & Beckley, pocket 33⅓
Naugatuck Cutlery Co. list net
Aaron Berkenshaw's pocket dis 25

Coopers' Tools.

Bradley's.....dis15@20
Braton's.....dis15@20

Chains.

Coil by cask.

3-16	¼	5-16	⅜	7-16	½
10½	9	8	7	6½	6¼

Drills and Drill Stocks.

Blacksmiths', each $2.50 dis 10
Blacksmiths', self-feeding, each 7.50 dis 20
Breast, P. S. & W ...dis 20&10

Drawing Knives.

Witherby's.....dis 65@10
Nobles Mfgr. Co..... 15
Adjustable handle.....20

Emery and Emery Paper.

Regular Numbers.....℔ lb 6c
Flour and F. F.....℔ lb 4c
B. & A. Emery Paper dis 30&5

Enameled & Tinned Ware.

Kettles.....dis 50
Sauce Pans.....dis 25
Tinned Sauce Pans.....dis 25

Files.

Auburn $5 to £. dis 35 pr cent
E.M. Boynton's, new list dis 25
J. & Riley Carr .....4.50 to £.
Johnson & Bro.....dis 30
Butcher's.....4.50 to £.
Walter Spencer & Co.'s "Diamond".....4.50 to £.
Fisher's.....4.75 to £.
Moss & Gamble.....4.50 to £.
H. Disston & Sons (new list).....dis 40 per cent
Heller Bros.' Horse Rasps dis 25
Nicholson.....dis 45
New American.....dis 45
Union File Co.....dis 40

Grindstones.

Ohio.....1¼@1¾ ℔lb
Nova Scotia.....1¼@1⅝ ℔lb

Hammers.

Maydole's.....dis 15
Cheney's.....dis 25
Hartford Hammer Co.....dis 20
Humason & Beckley.....dis 50
Verree.....dis 5
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50 and $1.75, dis25&10
Nelson Tool Works..dis 40&10
Warner & Noble's.....dis 5
Kip's.....dis 15
Yerkes & Plumb.....dis 15
Wilkinson's Smiths 11½c ℔ lb net

Hatchets.

Yerkes & Plumb:--Shingling, Nos.....1, 2, 3,
℔ doz $7 50, $8 00, $8 50, dis 25
Claw, Nos.....1, 2, 3,
℔ doz $8 25, $8 75, $9 25, dis 25
Lathing, Nos.....1, 2, 3,
℔ doz $7 50, $8 00, $8 50, dis 25

Nails.

10 to 60d.....$3 40
8 and 9d..... 25
6 and 7d..... 50
4 and 5d..... 75
3d..... 1 50
2d..... 2 75
3d fine..... 3 00
2d fine..... 3 75
⅞ inch..... 3 00
4d barrel..... 1 00
1¼ inch barrel nails..... 1 50
1½ do do do 1 75
1 do do do 2 50
⅞ do do do 3 00
Cut spikes, all sizes..... 35
Clinch nails, all sizes..... 1 75
Casing and box nails..... 75
Finishing nails,.....$1 25
Tobacco nails,..... 50

Nuts and Washers

Nuts, square .....7c off list.
Nuts, hexagon.....6c. off list.
Washers.....6c off list.

Picks.

Railroad, 4 to 5 lbs.. doz $7 75
5 to 6 lbs.. 7 75
to 7 lbs.. 8 50
7 to 8 lbs.. 9 50
Railroad Tamping Pick.. 7 to 8 lbs.. doz 13 50
Mill Picks per lb..... 75c

Rivets.

Iron.....dis 45
Tinned.....dis 45
Copper.....dis 50

Squares.

Dis
Steel or iron, case lots.....50
Try squares and T bevels.....40

Spikes—WROUGHT

All lengths by ¼ inch.....4½c
do do do 5-16.....3¼
do do do ⅜, 7-16 & ½ in 3¼

Shovels and Spades.

Ames' new list, July 1, 1881.....dis 15
Old Colony.....dis 15
Remington's (Lowman's Patent).....dis 30
Rowland's.....dis 40 and 10
Griffiths.....dis 40&10

Saw Sets.

Boynton's patent X Cut, per doz $12; Hand Saw, per doz $10.....dis 20
Stillman's Genuine, per doz $3 50 and $5 50.....dis 10
Stillman's Imitation, per doz $3 25.....dis 20&10
Common Lever, per doz $2 dis 30&10
Leach's No. 0 $8; No. 1 $15; dis 15
Hammer, Hotchkiss $5 50, dis 10
" Bemis & Call Co.'s new patent.....dis 40&5
Bemis & Call Co.'s Lever and Spring Hammer dis 30&5
Bemis & Call Co.'s Plate.dis 10
" " Cross-cut dis 12½
Aiken's Genuine.$13, dis 50&10
" Imitation....$7, dis 50
Hart's Patent Lever.....dis 20
Disston's Circular.....dis 40

Sad Irons.

From 4 to 10 lbs..per lb 3¾ net
Self-Heating.....℔ doz $9 net
Tailors..℔ doz $18 net
Gleason's Shield and Toilet.....dis 25
Mrs. Pott's Irons, double pointed.....dis 35
Mrs. Pott's Irons, square back.....dis 35
Enterprise Star Irons ...dis 35
Combined Fluter and Sad Iron.....℔ doz $15, dis 15

Scales.

Hatch, Counter, No. 171..
℔ doz. $42, dis 37½&10
Union Platform.....$6, dis 45
Fairbanks'.....dis 20
Buffalo Scale Co.....dis 20&5
Forsyth Scale Co.....dis 25
Howe's.....dis 20&10
Chatlilon's Eureka.....dis 25
Family Universal.....dis 50
Scale Beams.....dis 33⅓&10

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Planes.

Ohio Tool Co.....dis 20
Sciota.....dis 25
Bailey's Pat. Adjstbledis 20@10

Rules.

Stanley.....dis 66⅔ and 10

Sash Locks.

Discount.
Payson Mnfg. Co. "Perfect" 42
Simmons' Sash Supporters ..20

Hinges.

Champion double acting spring hinges.....dis. 30
Screw & Strap 8@12 in...$6. net
Gravity Locking Blind Hinges, Sargeant & Co. 70&10

Screws.

Dis
Flat head iron or steel [new list] per cent dis. 40
Flat head brass..... 40
Round head iron or steel 35
Round head brass..... 30
Brass and Silver capped. 30
Japanned, list of Plain Screws..... 40
Coach, patent Gimlet point, list per 100..... 60
Lag, taper points..... 60
Bed..... 10
Machine, flat head, iron. 55
round head, iron 50
Bench, iron.....55&10
wood, beech, per doz $3..... 10
wood, hickory.....20&10

Valves.

Dis.
Jenkins' Patent Gate Valves. 35
" " Globe " ..40
" Standard Packing " ..20

Wrenches.

Coe's genuine..... 50
Girard Standard.....dis 50 & 10
Mechanics' 10 and 10....dis. 40

Wire.

Brass and Copper.....dis 25
Bright & annealed, Nos. 0 @ 18 dis 50@52½
" " Nos. 19 @ 26 dis 60
" Nos. 27 @ 36 dis 65
Coppered Nos. 0@18, dis 45@47½
Galvanized, Nos. 0@18, market list,..... dis 40@42½
Tinned, Nos. 0 @ 18, dis 45@47½
Cast steel.....dis 40
Tinned Broom Wire, Nos. 18@25.....dis 55
Annealed Fence, Nos. 8 and 9.....dis 55@52½
Annealed Grape, Nos. 10 to 14.....dis 50@52½
Galvanized Telegraph, Nos. 7 to 9.....℔ lb 7¼c
Galvanized Telegraph, Nos. 10 to 11.....℔ lb 8¼c
Galvanized Telegraph, No. 12.....℔ lb 10½c
Fence staples...℔ lb 5½@5¾c
Fence Staples, galvanized, ℔ lb 7@7¼c

Stubs Steel Wire $6 00 to dis 30
Barb Wire, painted..... 8c
Barb Wire, galvanized.... 9c
Crucible Steel Ropes from ⅜ in. at 9c to 1¼ in. at.....52c
Best Selected Iron Ropes from 3-16 in. at 3c. to 1¼ in. at.....33c

Boiler Plates.

"Gaylord"-Standard Quality.
C. No. 1..... 4 50
C. H. No. 1 Sheil..... 4 75
C. H. No. 1, 50,000..... 5 25
C. H. No. 1, 55,000..... 5 75
C. H. No. 1 Flange..... 6 50
Firebox.....
T. S., 60,000.....(as per)..6 50
T. S., 65,000.....(act of)..
Homo. Steel, 70,000 (of Cong) 7 50
Heads, ¼c ℔ lb. extra.
N.B.-Eastern brands of boiler plate at from 2-10 to 3-10c ℔ lb less than above prices.

Sheet and Tank Rivets.

"Norway."
All sizes.....dis. 15
Boiler Rivets—"Albany." ⅛, ¼, 11-16, and ¾ in. diam. 5 50

Boiler Makers' Tools.

Doty's Power Shears ..net list
" Hand Lever Shears. net list
" Power Punch.....net list
" Hand Punch.....net list
Steel Screw Punch.....net list
Iron Screw Punch.....net list
Boiler Plate Rolls.....net list
Buffalo Forges & Blowers dis 20
Watson's " " net list
Spring Tube Expander..dis 15
Roller Tube Expander. net list
National Tube Cleaner .dis 20
Wire Flue Brushes.....net list
Anvils—'Peter Wright' 12½ ℔lb
Solid Box Vises..... net list

Nuts, Bolts, etc.

Square & Hex. Nuts ..7 off list
Washers.....6c. off list
Machine Bolts.....dis 65
Bolt Ends.....dis 60
Boiler Patch Bolts.....net list

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch.....dis 37½
"National" Standard Gauge 11 inch to 15 inch.....dis 25
"National" Special Locomotive Tubes.....net list

IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch..... 2 20
4¼ to 6 by ⅜ to 1 inch..... 2 30
1¼ to 6 by 1⅛ to 1¼ inch 2 60
1¼ &1¼ by ⅜ to ½..... 2 30
1 & 1¼ by ⅜ to ½..... 2 40
⅝ ¾ and ⅞ by ⅜ to ½..... 2 60

Round,

1 to 1⅜ inch..... 2 30
2 to 2¾..... 2 40
2¾ to 3¼..... 2 70
3¾ to 4..... 3 20
4¼ to 4½..... 3 70
4¾ to 5..... 3 90

Square.

1 to 1⅜ inch..... 2 20
2 to 2¾..... 2 40
2¾ to 3¼..... 2 70
3¾ to 4..... 3 20
¾ to ⅞..... 2 30

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch 2 40
1 to 1¾ by ¼ and 5-16 do 2 50
⅝ to ⅞ by ¼ and 5-16 do 2 70
⅝ to ¼ by ¼ and 5-16 do 3 10

Half Oval and Half Round.

Wagon box iron ¼ and ⅜ 3 80
1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1¼ to 6 by ⅛ to 3-16..... 2 80

Hoops.

1¼ to 2, Nos 16 to 18..... 3 20
1¼ to 4 do 13 to 15..... 3 10
1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24..... 4 00
No 25 to 26..... 4 20
No 27..... 4 40
No 28..... 4 80

English Steel.

Best cast.....℔ lb 16c
Extra cast..... 16¾c
Round machinery... 10c
Swaged, cast..... 18c
Best double shear... 15½c
Blister, 1st quality.. 13c
Refined tool steel.... 16¾c
Spring calking.... 7¼@7½c
German steel, best.. 11c
2d quality..... 10c
3d quality..... 9c
Sheet cast steel, 1st quality..... 15½c
2d quality..... 14¾c
3d quality..... 12¾c

American Steel.

Best brands of refined cast steel, ¾ to 2 inches..12c
Crucible cast.....7c
Open-hearth ditto.... 4½c
Hammer cast steel.... 9c
Spring cast steel..... 7½c
Bessemer and open-hearth spring..... 5c
Ditto plow..... 4½c
Steel boiler plate..... 6½@7c
Bessemer machinery 5 @6c
Spring and calking.. 7¼@7½c
Tire..... 5
Sleigh shoe..... 5

Bessemer Steel Tire.

¾ to 1 by 3-32..... 4¼ ℔ lb
¾ to 1 by ¼ to 5-32.... 4½ ℔ lb
¾ to 1 by 3-16 to ¼.... 4½ ℔ lb

Miscellaneous Cast Steel.

Auger and auger bit..... 1
Axle steel for wagons..... 7
Frog points and plates.... 8
Frog size bars..... 8½
Pick, hammered..... 10
Mattock, beveled..... 9
Table cutlery..... 7½
Trap spring steel..... 10
Pike and cant hook..... 9
Coal and granite..... 8½

TINNER'S STOCK.

Tin.

Banca,.....per lb. 24c
Straits..... " 25c
English..... " 26c
Bar..... " 27c

Tin Plate,

IC 12x12 charcoal..... $ 7 00
IC 14x20 do.....6 50@6 85
IX 14x20 do..... 8 85
DC 12½x17 do..... 7 00
DX 12½x17 do..... 9 00
DXX, 12½x17 do..... 11 00
DXXX, 12½x17 do..... 13 00
IC, 20x28 do..... 14 50
IX, 20x28 do..... 18 50
IC, 14x20, Best Roof..... 6 20
IX, 14x20, do..... 8 20
IC, 20x28 do..... 12 55
IX, 20x28 do..... 16 55
IC, 10x14 Best Coke..... 6 20

Solder.

Half and Half, in bars....15½
No. 1 do.....13½
Spelter Solder..... 30

Pat Planished Sheet Iron

(A)..... per lb 10 8-10c
(B)..... 9 8-10c

Nos	10	15	21	25
to	14	20	24	& 26
Com	3-60	3-80	4-00	4-20
Char	5-60	5-60	6-00	6-20

Sheets over 28 in. wide ¼c extra.

Zinc.

Sheet, cask..... 7c
Sheet, open..... ⅛

Cutlery.

Meriden Cutlery Co., (Table).....
Am. Miller Bro's Cutlery Company.....dis. 25
Humason & Beckley, Pocket.....dis. 33⅓
Naugatuck Cut. Co....list net
Aaron Burkinshaws poc dis.25

Tinners' Tools & Machines.

Machines (P. S. & W.) list add 20
Tools (P. S. & W.).....add 5

Plumbers', Steam and Gas Fitters' Supplies.

Wrought Iron Pipe....dis 65.
Mal'eable Iron Fittings.... list
Grey Iron Fittings.....dis 50
Steam Brass Goods.....dis 55
Water " " .....dis 50
Ludlow Gate Valves ..dis. 20
Register Gauge Cocks net 1 00
Montg'ry Gauge Cocks $1 each
Steam Gauges.....dis. 40
Steam Gauges 5 in. net dial per doz..... 30 00
Scotch Glass Tubes.....dis. 60
Tools..... special.
Duplex Iniectors..... net.
Soil Pipe & Fittings, Mott's List.....dis. 30
Sinks, Mott's List.....dis. 25
Copper Bath tubs, Sinks, etc.....dis. 25
Galvanized Iron Boilers "Scaifes."....dis. 50
Marble Slabs, "Counter-sunk net per ft.....$ 1 25

Babbitt Metal.

Babbit Metal, No. 3. 14 X.... 42
Babbit Metal, No. 2, 16 XX.. 46
Babbit Metal, No. 1, 18 XXX.. 50
Babbit Metal, C..... 20
Babbit Metal, B..... 24
Babbit Metal, A..... 32
Dis 40 per cent.

LEAD.

Amerc'n, ℔ lb..... 5¼c
Bar, ℔ lb 6¾c dis 10 per ct
Pipe, ℔ lb 6¾c dis 10 per ct
Sheet, ℔ lb 7¼c dis 10 per ct
Tin-lined pipe 15c dis 10 per ct
Block..... 45c.
Chilled Shot..... 8c

COPPER.

Lake Ingot.....18¼@18¾c
Baltimore..... 18c
Arizona..... 17¾c
Sheathing Braziers Copper, Bolts, &c.
Brazier's Copper, ordinary sizes, 16 oz. per sq. foot, and over per lb.....30c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq. foot, per lb. 32c
Brazier's Copper, 10 oz and 12 oz. per sq. ft. per lb. 34c
Brazier's Copper lighter than 10 oz. per sq. ft. per lb 36c
Circles less than 84 inches in diameter.... per lb. 33c
Circles 84 inches in diameter and over.....per lb. 30c
Segment and Pattern sheets per lb. 33c
Locomotive Fire Box sheets per lb. 30c
Sheathing Copper, over 12 oz. per sq. ft.... per lb. 28c
Bolt Copper..... per lb. 30c
Copper Bottoms per lb. 31@32c
No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft.

Tinning.

14x48..... per sheet 6c
All other size sheets, 2½c per square foot. For tinning both sides, double the above amount

SCRAP IRON AND OLD METAL.

DEALER'S SELLING PRICES.

Net Tons.
No. 1 wrought scrap..... $23
Sheet and hoop " .....10@11
Cast scrap, (No. 1 heavy).. 22
Cast Scrap (Stove Plate).. 16

OLD METALS.

Old copper per lb..... 14c
No. 1 H. Brass per lb..... 15
Heavy yellow Brass do..... 15
Light Brass per lb..... 8
Scrap Zinc per lb..... 4
Tea Lead per lb..... 3¾
Heavy Lead per lb..... 3

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas Pipe

Inside Diameter Inches.	Plain, Price Per Foot.	Galvan. or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛	08		.40	.24
¼	08	$0 11	.54	.42
⅜	09	12	.67	.56
½	11	15	.84	.85
¾	13½	19	1.05	1.13
1	19	28	1.31	1.67
1¼	27	40	1.66	2.26
1½	33	47	1.90	2.69
2	46	64	2.37	3.66
2½	75	1 00	2.87	5.77
3	95	1 30	3.50	7.55
3½	1 25	1 70	4 00	9 05
4	1 50	2 05	4.50	10.73
4½	1 75	2 40	5.00	12 49
5	2 25	3 00	5.56	14.56
6	2 75	4 00	6.62	18.76
7	3 75	....	7.62	23.00
8	4 75	....	8.62	28.00
9	6 50	....	9.68	34.40
10	8 00	....	10.75	40.64
12	12 00	....	....	54.65

Discount, 70 per cent.

BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb.

High Brass.

All Nos not thinner than No No. 28, wider than 2 in. not wider than 14 inch.....30c
All Nos to No. 28 inclusive, and widths over 14 to 20 in. inclusive.....35c
All Nos to No. 28, inclusive, and widths over 20 to 30 in. inclusive.....38c
¼c per lb advance on each No above Nos 28 to 38, inclusive.
All Brass thinner than No. 8 is Platers' Brass at.....53c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches 37c

Low Brass.

4c pr lb. more than High Brass
Gilding metal 8c per lb. more than High Brass.
Platers' or Gold Metal
In Bars.....48c
Sawed.....51c
Planed or Polished...54c

For Slitting.

Metal in width in. to ⅛ in. to No. 28, inclusive, 1c per lb., advance.
Metal, in width 2 in. to 1 in. thinner than No 28, 2c per lb. advance.
Metal, in width ⅛ in to ¼ in. thinner than No 28, 5c per lb. advance.
Metal ¼ in. in width and less, 10c per lb. advance.
Any of the above widths cut to particular lengths add 7c per pound.

COAL,

WHOLESALE.

Wholesale f.o.b. cars at Cleveland:
Carbon Hill and Monday Creek.....$2 80
Massillon.....2 75
Brier Hill.....3 50
Pittsburgh.....3 00
Saline ville.....2 25
Tuscarawas.....2 25

RETAIL.—Delivered.

Massillon Lump.....$3 75
" Nut.....3 50
Carbon Hill and Monday Creek, lump.....3 50
Carbon Hill and Monday Creek, nut.....3 25
75c less on cars by car load.
Anthracite Stove and Chestnut.....7 00@7 25
Egg and grate.....7 00

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15.....
11x14 to 15x24..... 8 50
16x24 to 20x28..... 9 75
15x34 to 24x30..... 10 75
26x28 to 24x36..... 11 50
26x36 to 26x44..... 13
26x46 to 30x50..... 14 00

DOUBLE THICKNESS

6x8 to 10x15..... 11 7
11x14 to 15x24..... 13 25
16x24 to 20x28..... 15 75
15x34 to 24x30..... 17 25
26x28 to 24x36..... 18 50
26x36 to 26x44..... 21 25
30x50..... 22 50
30x52 to 30x54..... 23 25
30x56 to 34x56..... 25 00
34x58 to 34x60..... 27 75
36x60 to 40x60..... 30 00
Dis 60 & 15 single, 60&20 double

OILS.

Pure Oils. p'kages included

Sperm, winter bleached per gal..... $1 25
Whale, winter bleached per gal..... 63
Straits..... 50@53
'A' oil for tanner's use 35 @40
Lard oil extra W S.. 88@90
do No 1 do..... 74@78
do No 2 do..... 63@67
Tallow oil..... 72@74
Neatsfoot oil pure.. 95@99
do No 1..... 80@85
Linseed oil, raw..... 55
do do boiled..... 58
Cotton seed oil white 64 @ 66
do do yellow 60 @ 63
West Virginia lubricating 28 deg..... 20c@30c
Paraffine oil winter pressed..... 25@ 30
Machinery..... 40
Engine..... 50
Miners' oil..... 40@45
Drilling oil..... 40
Turpentine, per gal..... 57

Hides and Leather.

Prime cured hides,.... 8½@8½c
Green hides..... 6@6½
Bull, scrubby, badly scored or damaged, cured, two-thirds price.
Prime dry hides..... 12@14
Horse hides, green.... $2 00
Prime cured veal calf, 12½@13
Ohio Deacons, Salted..... 60
Pelts, wool on..... 30
Fresh slaughter sheep..... 50
Prime cured calf skins..... 18
Hemlock rough..... 23@24
Oak harness..... 34@40

AKRON IRON CO.,

AKRON. O.

Patent Hot Polished Shafting.

Superior to any shafting in market for the following reasons, viz.: 1st.—It is perfectly straight and round. 2d.—It can be rolled accurately to any desired gauge 3d.—It has the beautiful blue finish of Russia Sheet Iron, rendering it less liable to rust or tarnish than shafting of the ordinary finish. 4th. It will not spring or warp in key seating like most of the other manufactured shafting sold in the market, and, as a consequence, is admirably adapted for line and counter shafting. 5th. The surface is composed of magnetic oxide of iron, forming a superior journal or bearing surface. 6th. It is made of superior stock.

Sizes made from ⅞ to 3⅛ inches, advancing by sixteenths. Price lists, with references and other information, furnished on application to

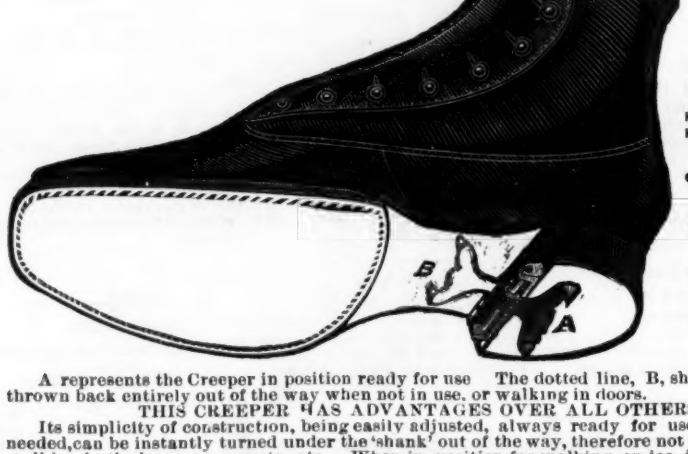
AKRON IRON CO., Akron, O., Manuf'rs.

E. P. BULLARD, 14 Dey-st., New York, Cen'l Eastern Agt. 1

The Improved "Climax" Reversible Ice Creeper.

CHILDS, GROFF & COMPANY,

MANUFACTURERS, CLEVELAND, OHIO.



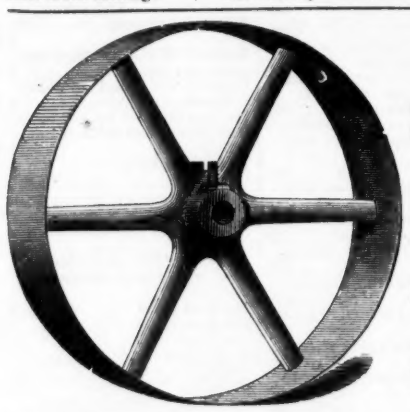
Patented April 30, 1878.

Perfect Safety Secured in Walking on Icy or Slippery Pavements.

A represents the Creeper in position ready for use The dotted line, B, shows the Creeper thrown back entirely out of the way when not in use, or walking in doors.

THIS CREEPER HAS ADVANTAGES OVER ALL OTHERS.

Its simplicity of construction, being easily adjusted, always ready for use, and when not needed, can be instantly turned under the 'shank' out of the way, therefore not interfering with walking in the house on carpets, etc. When in position for walking on ice, it is sure protection from falling. For sale by hardware and shoe dealers generally. 9



Pulleys, Hangers, Saw Arbors Shafting, &c.

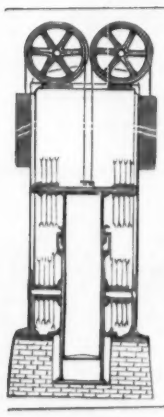
Stave Machinery a Specialty.

Having recently added New Machinery for getting out Pulleys we can now furnish them on short notice and at bottom prices. Before ordering elsewhere please send for price list and discounts.

Address,

John S. Oram,

155 & 157 River-st., CLEVELAND, O.



EDWARD C. POST,

Successor to Smith & Post, Manufacturer of

Hydraulic and Steam Power, Passenger and Freight and Hand Elevators,

Shafting, Pullevs, and Hangers.

Corner St. Clair and Washington Streets,

TOLEDO, O.

☛Send for Circulars and Price List.

THE

Noteman Rotary Engine

AND

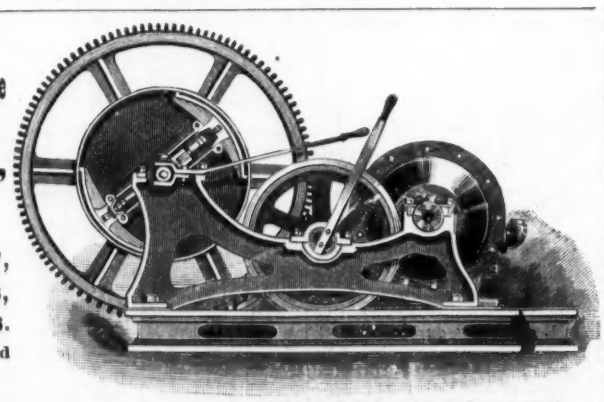
Pump Co.,

TOLEDO, O.,

Manufacture

Hoisting Machinery, Stationary Engines, High Speed Engines.

For Specialties Send for Circulars.



TOLEDO, OHIO, December 13, 1882.

THE NOTEMAN ROTARY ENGINE & PUMP CO.,

GENTLEMEN:—Your Engine used for pumping when sinking cassions for the piers of the Wheeling & Lake Erie Bridge, gave good satisfaction. I consider your engine, for general use, the best made, and have no hesitancy in recommending it to contractors and builders. J. G. KANEY, Chief Engineer, W. & L. E. Bridge Co.

TWIST DRILLS A SPECIALTY.

No. 20, Perkins' Power Block, Cleveland, Ohio.

To Speculators: A Grand Bargain.

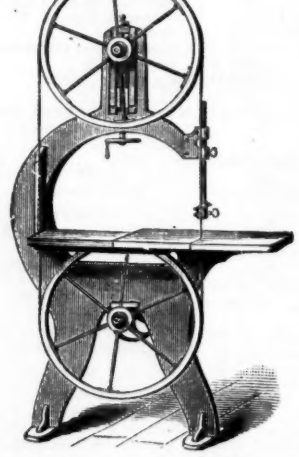
A LARGE & FULLY-EQUIPPED MACHINE SHOP FOR SALE.

I will sell at low figures and at reasonable terms my magnificent Machine Works at Newark, Ohio, fully equipped with every necessary to make a first-class establishment It stands on two acres of ground in the center of this thriving city. A railroad switch runs into the works for loading and unloading; excellent railroad facilities; cheap living; an unusually healthy locality.

Address,

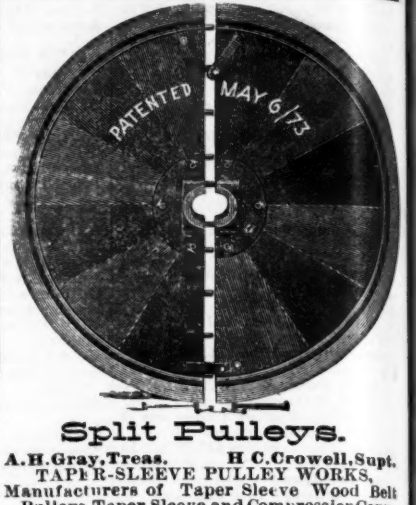
F. J. L. BLANDY
Zanesville, O.

Eureka Band Saw.



We build three sizes of this machine with 26, 30 and 38 inch wheels. The two smaller sizes will saw hard wood 21 in. thick, the largest 16 in. thick. They are made of the best material and are well made. For further information address

FRANK & CO.,
Manufacturers of
WOOD WORKING MACHINERY,
176 Terrace Street, BUFFALO, N. Y.



Split Pulleys.

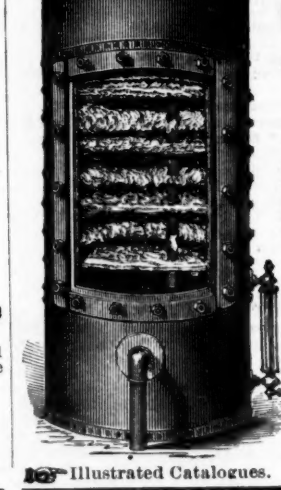
A. H. Gray, Treas. H C. Crowell, Supt.

TAPER-SLEEVE PULLEY WORKS, Manufacturers of Taper Sleeve Wood Belt Pulleys, Taper Sleeve and Compression Couplings, Adjustable Dead Pulleys, Wood Pulleys, Split or made in Halves, Friction Clutch Pulleys, and Friction Clutch Couplings.

YOU can start a load with this clutch, at any speed, with ease and safety.

ERIE, PA.

Stilwell's Patent LIME-EXTRACTING HEATER AND FILTER COMBINED



IS THE ONLY

Lime-Extracting HEATER

THAT WILL

Prevent Scale in Steam Boilers.

REMOVING

ALL IMPURITIES FROM THE WATER

before it enters the boiler. Thoroughly tested. Over

3,000

of them in daily use.

This cut is a fac-simile of the appearance of a No 5 Heater.

STILWELL & BIERCE M'F'G CO.,

DAYTON, OHIO.

☛Illustrated Catalogues.

F. E. MYERS & BRO.

Manufacturers of

THE MYERS FORCE PUMP.

Awarded First Premium Ohio State Fair, 1882, for Well and Force Pump.

The Only Force Pump Having an Expansive Plunger Bucket. Works easy, throws a constant stream, and possesses unusual merit when throwing water with hose in case of fire, washing buggies and windows, filling boilers and tanks, sprinkling lawns and gardens, &c. Has porcelain-lined and brass cylinders. It is easily set up, and is the BEST FORCE PUMP IN THE MARKET. Its superiority is attested by all who have seen it operate.

HAYING TOOLS.

DOUBLE HARPOON HAY FORKS, SINGLE HARPOON HAY FORKS, WALKER HAY FORKS, SPROUTS DOUBLE SHEAR FORK, and SINGLE KNIFE and FORK COMBINED, PALMER HAY FORKS, ETC.

HAY CARRIERS.

IRON ROD TRACK CARRIERS.

—o—

Large Line of Grapples, Pulleys, Floor Hooks, Rope, Fixtures, etc.

WOOD TRACK CARRIERS.

Ohio Branch Office of the Pennock Mfg. Co., Kennet Square, Pa.

State Agents for the King Barb Fence Wire Stretcher.

Send for Our Illustrated Catalogue of Haying Tools,

Giving full description of the large line of goods we are prepared to furnish. Special prices and terms to dealers.

F. E. Myers & Bro., Ashland, Ohio.

Dayton Malleable Iron Co.,

Manufacturers of

Air Furnace Iron.

A full line of Carriage and Plow Hardware kept in stock.

☛Catalogues for the Trade.

Cleveland Business Directory.

Assayers and Analytical Chemists.

JUDSON, W, E, Ana ytical Chemist, 8 Cushing Block.

Bolt and Nut Works.

HOTCHKISS & UPSON MANUFACTURING CO. Manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws.

Boiler Makers.

SMITH & TEACHOUT— (Established 1857.) Boiler, Tanks, Stills etc. 439 Broadway.

Bridge Builders.

BUCKEYE BRIDGE AND BOILER WORKS, mfrs of Arch & Truss Bridges, Boiler Tanks and Oil Stills. Bet. Wasson St. and Case Ave.

Coal and Iron Exchange.

JACKSON IRON CO. Iron Ore and Pig Iron. Rooms 8 and 9. Fayette Brown, Gen. Agent.

RHODES & CO. Coal, Iron Ore and Pig Iron. Rooms 1 and 2.

Carriage Blacksmith.

STRIEBEL, CHAS. manfac'r. of Carriages and Wagons and platform trucks. Horse shoeing and general blacksmithing .93 Woodland ave.

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts.

Church and School Furnture.

FAULHABER, GEO. manufacturer of School and Church Furniture. Fine Hard Wood work a specialty. 203 Ontario Street.

Custom Boots and Shoes.

ROONEY, JOHN manufacturer of hand-made Boots & Shoes, custom made and warranted. 177 Ontario Street.

Carriage Repository.

GREENE'S, J. O., Carriage Repository, 408 Superior street and 52, 54 & 56 Rockwell street, dealer in Fine Carriages. Repair shop in connection.

Coal and Pig Iron.

ANDREWS, HITCHCOCK & CO., Briar Hill, Coal and Pig Iron. 122 Water Street.

Dyers.

BICHLMYER, A., 122 Seneca st. Gentlemen's and Ladies' Clothes Cleaned and Dyed.

Foundries.

BOWLER & CO., Car Wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

CLEVELAND MALLEABLE IRON CO., manufacturers Malleable Iron Castins.

LAKE SHORE FOUNDRY, Water and Gas Pipe, Light and Heavy Castings. Alabama st.

TAYLOR & BOGGIS, successors to H. & H. F. Taylor, Iron Founders, 65 to 73 Central Way.

FITZSIMONS WM. & SON, Rolling Mill and Machinery castings. Rolls a Specialty. No. 435 Broadway.

File and Saw Works.

PARKIN, W. H. & CO., Hand-cut Files and Rasps, dealers in Disston's saws, 11 So. Water.

Flue Cleaner.

CLEVELAND FLUE CLEANER M'F'G. CO. manf'r of Aitchison & Doolittle's Patent Steam Flue Cleaner, 22 & 24 Power Block.

Hotels.

FOREST CITY HOUSE, cor. Pub. Squ. and Superior st., Terrill & Ingersoll, Props.

KENNARD HOUSE, D. McClasky, Prop.

NEW ENGLAND HOTEL, Water st., W. W. Wolcott, Prop. Refitted and refurnished.

STRIEBINGER HOUSE, between Ontario and Seneca sts. $2.00 per day. Hawley & Langton.

CITY HOTEL, Seneca street. H. B. West, proprietor. $1.50 per day.

Hides, Pelts and Leather.

DENNISON BROS., dealers in Hides, Pelts, Furs and Tallow, 48 and 50 River street.

Hardwood Lumber.

MARTIN, J. T., dealer in Hardwood Lumber, Stone's Levee, near Central Way

Cleveland Business Directory.

Lumber.

WOODS, PERRY & CO., manufacturers and dealers in Lumber, Lath, etc., 5 Carter st.

FISHER, WILSON & CO., wholesale lumber dealers (pine & hard wood), rough and dressed umber, timber, lath, shingles, etc. 47 Central Way.

KRAUSE, C. A., & SON, wholesale and retail dealers in lumber. Yards cor. Superior and Wason and 281 Merwin streets.

Oil Manufacturers.

AMERICAN LUBRICATING OIL CO., manf'rs of lubricating oils, 23 Euclid ave.

Hardware and Iron.

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water street.

CLEVELAND ROLLING MILL CO., manufacturers of Steel and Iron Wire and Steel Tire.

Lime Manufacturers.

RUSSELL LIME CO., manufacturers of White Lime; also dealers in Plaster, Cement, etc. 85 Elm street.

Machinery and Boilers.

CLEVELAND STEAM FURNACE CO., Engines and Boilers, cor. Detroit and Center sts.

KRITCH, K. E. Metal Pattern Maker. Small machinery repaired. Lawn Mower sharpening a specialty. 42 South Water Street.

Mercantile Agency.

THE MERCANTILE AGENCY. R. G. Dun & Co. proprietors. 121 Superior street.

Pattern and Model Makers.

WHITTINGHAM, J. & C., Metal Pattern and Model makers. 52 Canal Street.

REID, J. C., Pattern and Model Maker. 52 Canal Street., (Up Stairs.)

COTTRELL & CO., W. L., Pattern Makers, 53 Center street.

Stair Builder.

PFEIL, CHAS, Stair Builder; Hard Wood Mantles and Office Railing. Works, 49 & 51 Canal street, Cleveland, Ohio.

Steel Stamps and Stencils.

FLEHARTY, J. H. & CO., Rubber Stamps, Seals, Stencils. 197 Superior street.

Steam Furnaces.

CUYAHOGA STEAM FURNACE CO., Manfrs of Land and Marine Engines. Machinery for Blast Furnaces, Rolling Mills, Bessemer Steel Works, &c. Mill-Gearing and all kinds of Castings, Foundry, Machine and Boiler Shops.

Trunks and Valices.

FABER, J. manuf. Trunk, Traveling Bags and Ladies' Fine Satchels. Sample trunks and Cases a Specialty. 56 Public Square

Vessel Agents.

WEBB, H. J. & CO., Ship Brokers and Vessel agents. 17 & 18 Board of Trade Building. 122 Water Street.

Wood Carving.

HERKOMMER, J., Carver and Ornamenter in Composition. 225 Erie street.

Business Directory.

Akron, O

AKRON IRON CO., manufacture best Common, Refined and Charcoal Iron.

CASCADE HOUSE, cor. Mill and Summit sts., near Depot. J. Downie, Prop.

MCNEIL, J. C., Steam Boilers, Heavy Sheet Iron Work. Repairing promptly executed.

PERKINS, C. E., dealer in Agricultural Implements, machinery, and Manufacturers' Agents.

TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc.

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street.

AKRON POLISHING & PLATING W'RKS Man'f'rs of solid leather wheels for polishers

Alliance, O.

MCFARLAND, J. W. Engine and Machine Builder, and General Machine Jobbing,

Buffalo, N. Y.

SANDS, PAUL, Marine and Stationary Steam Engine Works mfr. of drilling machines, foot and power lathes. 70 Columbia st.

EMPIRE STATE MF'G CO., O. F. Swift, prop'r, manfr of Fluters, Sad Irons, Spun Copper & Half Copper Tea Kettles. Washington, cor. Ohio.

WHITE, L. & I, J. manf'r's of Coopers' Tools, Carpenters' Tools, and Ship Tools. Also manf'r's of Planer Knives and Machine Cutters to order. 310, 312, 314 Exchange street.

THE BUFFALO NUT AND BOLT CO.—[Limited.] Manufrs. of Hot Pressed Nuts, Bolts, Washers, Rivets, &c. No. 226 Ohio St.

Business Directory.

Cuyahoga Falls, O.

THOMAS BROTHERS, manfrs of Ohio Stoneware. Cuyahoga Falls Stoneware Factory, cor. Main and Broad streets.

TURNER, VAUGHN & TAYLOR, manufacture engines, presses and grinding machinery for clay; also paper, chain, wire and flour mill machinery. Send for Circulars and price list.

SNYDER, H. wholesale manu acturer of Sash, Doors, Blinds, &c. Send for Price Lists.

THE CUYAHOGA FORGE AND IRON CO. manfrs. of every description Car, Truck and Driving Axles, Forging, Shafting.

Columbus, O.

PAT. ADJUSTABLE WINDOW CURTAIN Cornice, manufactured by Strader's Curtain Cornice Works.

ROYCE & PULLING manufrs of Patent Steam Pumps for all purposes. Store room 30 High street. Works Nos. 5 and 7 Scioto street.

U. S. CARRIAGE CO. builders of fine Carriages, Buggies and Phætons. Salesrooms and Office 257, 259 and 261 Fourth street.

REYNOLDS BROS., manufact'rs of hand-cut Files and Rasps. Old files re-cut. Send for Price List.

CITY BOILER WORKS, manfrs of Stationary, Portable and Locomotive Steam Boilers. All work warranted. Borger Bros. & Co.

MURRAY, HAYDEN & CO., manfrs of Malleable Iron. Cor. Randolph & West streets.

Canton, O.

DIEBOLD SAFE & LOCK CO., manuf'rs. Safes, Locks, Bank and Safe Deposit Works.

NOVELTY IRON WORKS, Mill work, Shafting, engines, Imperial job printing press, etc.

BELDEN BURNER CO.—H. S. Belden—B. C. Goodrill. 158 and 160 S. Market-st., Manfrs of gasoline burners and fixtures, and contractors for lighting streets.

Erie, Pa.

GUNNISON, A. B., wholesale manufacturer of Wood Pumps. 233 East Twenty-Second St.

BALL ENGINE CO., limited, manufac,turers of Automatic Engines of 15 to 30 horse power.

NOBLE SEWING MACHINE CO. manufacturers of the New Noble Sewing Machine. Send for circulars and prices.

A. B. FELGEMAKER & CO. Church Organ builders. Descriptive catalogue furnished on application.

Geneva, O.

THE ENTERPRISE MACHINE CO., L. L. Crane, Pres't, manfrs of Machinists' Tools and Machinery. Gear Cutting a specialty.

Lima, O.

LIMA HOUSE, centrally located; telegraph office in the house. J. Goldsmith, Prop.

Meadville, Pa.

CURRY & CO. general jobbers in Castings of all kinds.

Niles, O.

REEVES Bros., Manufacturers of Boiler and Tank Iron, etc.

Olean, N. Y.

MYRICK BROS. & CO., manufact'rs Engines and Boilers, oil drilling tools, rig irons, etc.

Oil City, Pa.

REID, JOS. Machinist, steam engine and pump repairing. Brass and iron castings, light and heavy, made on short notice.

Pittsburgh, Pa.

PRINTING PRESSES. W. A. Bunting, fmanuacturers' agent. Printers supplies, type, cards. 42½ Sixth Street. [Up stairs.]

BAIR & GAZZAM, practical machinists; gear cutting a specialty. Rice's Feed Water and Heater. 17 Wood street, corner First Avenue.

Painesville, O.

NORTH AMERICAN CUTLERY CO., manufacturers of Steel Shears and Scissors—best quality.

Ravenna, O.

THOMPSON, T. F., dealer in Agricultural Implements, farm machinery, hardware, seeds, fertilizers, &c. Cor. Main and Prospect streets.

BALDWIN, D. L. & SON, Contractors & Builders and manufacturers of all kinds of Moulding, flooring, siding, &c. Rip, Band and Scroll Sawing.

Rochester, N. Y.

GOWE, JNO. N., mfrs. of Specialties, such as Machine forging, bridge bolts and trusses, railroad switches, spike, mall, chisels, &c.

ELEVATORS for Hotels, Factories and Private Houses. J. S. GRAHAM & CO.

WOOD-WORKING MACHINERY. Send for Catalogue. J. S. GRAHAM & CO.

RAZOR STROPS. Sole mfrs. of all kinds of Razor Strops. Uischt, Linn & Co. 131 N. Water

Business Directory.

Rheims, N. Y.

GREAT WESTERN CHAMPAGNE. Finest made in America. Equal to best imported. Has taken highest awards every where, and is used all over the Continent. Try a case, and you will have no other. Pleasant Valley Wine Co., Rheims, N. Y.

Steubenville, O.

DORRANCE, D. W., Tool Works, manufacturer of hand-made miners' and stonecutters' Tools. Promp attention given to mail orders.

Sandusky, O.

SANDUSKY WHEEL CO. manfrs. of Sarven Patent Wheels, Carriage Bodies and Seats, Plain Wood Hub Wheels, Banded Hub Wheels, Jacob's Patent Neck Yokes.

Sandy Lake, Pa.

EBERMANN, W. S. & SONS, manfrs. of the celebrated Ebermann Boiler Feeder. Send for Circulars and Price List.

Titusville, Pa.

FOSTER & MCKAY, dealers in boilers and engines, tubing, casing, old iron, rope, and all kinds of metals. Washington street, near Railroad.

Toledo, O.

BAKER, HERBERT, Machine Shop and Iron Foundry. 98 and 100 Erie street.

TOLEDO FOUNDRY AND MACHINE CO builders of Steam Engines, Circular Saw Mills and all kinds machinery. Water St., cor. Cherry.

RUSSELL IRON WORKS, mnfrs. of Architectural Iron Work, castings, pulleys, shafting and steam bending machinery. Corner Water and Lagrange streets.

STANDARD SAW WORKS, H. Bartley, manufacturer and dealer in Saws of every description. All kinds of Springs made from Sheet Steel. Reaper, Hay Knives Truss, Springs, &c. made to order. 92 St. Clair Street.

UNION Manufacturing Co., manufacture Sewing Machines, Wash-boards, Children's Wagons, Carts, Wheelbarrows, Sleds, Kitchen Wooden ware, &c.

BOAT BUILDING: Hepburn Bros., prop. Union Boat Works. Boats of all kinds made to order. For sale or rent. Water Street, foot of Cherry.

Wheeling, W. Va.

EXCELSIOR MACHINE WORKS, Redman & Co., general machinists and manufacturers of Marine and Stationary Engines, Hangers, Pullies, Shafting, &c. Cor. 18th & Chapline streets.

Youngstown, O.

BELL, EDWIN & SONS, manuf. of Nail Kegs, Pat. coiled hoops, slack barrel and keg heading and oil barrel stock.

DINGLEDY, G. H. dealer in rough and dressed Lumber, Shingles and Lath.

MORTON HOUSE, formerly Maitland House, James Morton, Prop.

TOD HOUSE, cor. Diamond and Market streets. Henkel & Bowman. Props.

THE FORSYTH SCALE CO. Scales, Truks Copying Presses and Express Barrows.

Zanesville, O.

KIRK HOUSE, William Kirk, proprietor. $1.50 per day.

Brattleboro', Vt,

A JOY FOREVER!

ESTEY ORGANS

Manufactured by

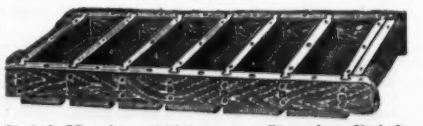
J. ESTEY & CO.,

Brattleboro', Vt.

(Catalogue free on application.)

D. J. C. ARNOLD,

Manufacturer of



Brick Moulds, Off-bearing Trucks, Brick Wheelbarrows, &c.

All goods first class. Orders and correspondence solicited. NEW LONDON, O.

Arnold Furnace Co.,

Manufacturers of

'Arnold' Foundry Pig Metal,

NILES, OHIO.

The "Arnold" Iron is made from the famous Mineral Ridge Band Ore and the Celebrated Arnold Ore from the Adirondack Mountains, which, from its peculiar properties, makes an iron far superior to any in the market, for stove plate, light and heavy machinery and pulley castings, the product being a clear, soft, strong, smooth, perfect, unwarped, unshrunken article.

ORDERS SOLICITED. 3

TRAVELERS' REGISTER.

Lake Shore & Michigan Southern.

TRAINS GOING EAST.	Arrive. From West.	Depart. From East.
Fast N. Y. Express	*1 35 a m	*1 50 a m
N.Y.,Bo't'n & At. Ex.	*7 05 a m	*7 30 a m
Elyria Accommodation	‡8 35 a m	.....
Pt.Clinton Accomd'at'n	‡11 00 a m	.....
Buffalo Accommodation	‡11 00 a m	‡11 15 a m
N. Y and B't'n Fast Ex.	*2 25 p m	*2 55 p m
Conneaut Accom'dat'on	.....	‡4 50 p m
Night Express	‡10 10 p m	‡10 35 p m
TRAINS GOING WEST.	**Arrive. From East**	**Depart. From west.**
Fast Limited Express	*12 23 a m	*12 33 a m
Mich. Ex. via Sandusky	*2 50 a m	*3 05 a m
Chi. Ex. via Sandusky	‡6 35 a m	7 00 a m
Mich. Ac. via Norwalk	.....	‡6 40 a m
Conneaut Accom'dat'n	‡8 40 a m	.....
Toledo Ex. via Norwalk	‡1 25 p m	‡3 30 p m
St. Louis Ex. via San'ky	*1 40 p m	*2 05 p m
Chi. Pac.Ex. via Nor'lk.	*7 05 p m	*7 35 p m
Pt.Clinton Accom'dat'n	.....	‡5 00 p m

Sunday trains for Nottingham—Depart 0:00 a. m. and 2:15 p. m., return at 10:05 a. m. and 4:45 p. m.

Reference marks—*Daily. †Daily except Sunday. ‡Daily except Monday.

Cleveland, Columbus, Cincinnati & Indianapolis.

ARRIVALS.

No. 2 Col. & Cin. & Ind'polis Ex.	*7 10 A.M
No. 8 C. T.V. & W. & Clev Accom.	10 30
No. 12 St. Louis & New York Exp.	*3 00 P.M
No 6 Indianapolis & Columbus Exp	10 20
No. 4 Columbus & Cincinnati Exp.	*3 40
No. 10 Wheeling Express	7 15

DEPARTURES.

No. 1 Cincinnati & Columbus Exp.	*8 00 A.M
No. 11 Cleve. Indianap. & Wheel'g Ex	7 10
No. 3 Special St. Louis & Cin. Ex.	**1 55 P.M
No. 5 Night Express	*7 25
No. 7 C.T.V. & W. & Col. Accom	4 00

**This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

Cleveland, Tuscarawas Valley & Wheeling.

ARRIVALS.

Wheeling & Cleveland Express	7 15 P.M
Uhrichsville Express	10 15 A.M

DEPARTURES.

Wheeling & Cleveland Express	7 10 A.M
Uhrichsville Express	4 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS.	a.m.	a.m.	p.m.	p.m.
Through from East	6 50	.....	.....	*7 00
N.Y. P. & O. (Mah'g)	10 55	.....	2 00	*7 00
Pittsburgh Express	.....	.....	2 00	*7 00
Pitts'g& Yo'gs'tn Ac	10 55	.....	.....	10 15
DEPARTURES.	**a.m.**	**a.m.**	**p.m.**	**p.m.**
Through E'tern Train	*7 10	.....	.....	10 45
N. Y. P. & O. (Mah'g)	.....	.....	.....	4 25
Yo'gs'tn & Pitts'g Ac	.....	11 00	.....	.....
Pittsburgh Express	.....	*7 10	*2 30	.....

Cleveland & Pittsburgh.

	ARRIVE.	DEPART
Pittsburg & Wheeling	2 30 P.M	8 25 A.M
Express	7 30	2 00 P.M
Alliance Accommodation	10 10 A.M	3 45
Ravenna Accommodation	8 37	5 30
Night Express	6 25 A.M	†11 40 P.M
Newberg Accom'dation	12 10 P.M	11 00 A.M
Newberg Accom'dation	1 50 P.M	12 30 P.M

†Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

	ARRIVE.	DEPART
Wheeling Junction	10 15 A.M	8 30 A.M
Canton	1 30 P.M	5 00 P.M
Wheeling Junction	6 15 P.M	3 20 P.M

Special trains leave on Sunday at 8.25 A. M. and 4.20 P.M., arriving at Cleveland at 1005 A. M. and P. M. 6.25

Depot foot of South Water Street.

Connotton Valley Railway.

	ARRIVE.	DEPART
Passenger	8 00 a. m.	8 10 a. m.
Passenger	10 20 a. m.	2 00 p. m.
Passenger	6 35 p. m.	4 25 p.m.

Depot corner Commercial and Fifth Streets

Cleveland, Akron & Columbus Railroad,

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Railroad to Hudson, for Akron, Columbus, etc.

	ARRIVE.	DEPART.
Mail	2 30 P.M	8 25 A.M
Express	7 30	2 00 P.M
Accommodation	10 10 A.M	3 45 P.M

"The Nickel Plate."

	ARFIVE.	DEPART
Local Passenger	10 00 P.M	3 48 P.M
Local Passenger	9 18 A.M	6 55 A.M
Conneaut Accom'dation	9 05 A.M	4 30 P.M

CLEVELAND & PITTSBURGH

RAILROAD.

Condensed Time Table of Passenger Trains, corrected to Jan. 21, 1883.

MAIN LINE—GOING WEST.

	Dy Exr'ss.	Mail Expr'ss.	Fast Line.	Accom.
Leave Pittsburgh	8 30a m	1 55 pm	11 50 pm	4 00 pm
Allegheny	8 40	2 05	12 00 am	4 10
Arrive Rochester	9 25	2 55	12 50	4 55
Beaver	9 30	3 01	12 56	5 01
E. Liver'l	10 07	3 34	1 38	5 43
Wellsville	10 18	3 45	1 50	5 55 pm
Salineville	10 57	4 22	2 33	Arrive.
Bayard	11 35	4 57	3 20	.....
Alliance	12 05p m	5 25	3 55 am	.....
Leave Alliance	12 20	5 30	4 05	7 40 am
Arrive Ravenna	12 58	6 03	4 44	8 20
Hudson	1 24 pm	6 27	5 12	8 50
Cleveland	2 30 pm	7 30 pm	6 25 am	10 10 am

Accommodation train leaves Ravenna at 6:50 a.m., and arrives at Hudson at 7:20 a.m., Cleveland 8:37 a.m.

☞ Fast line and Day Express run through Sleeping Cars from Pittsburgh to Cleveland.

NOTE.--Fast Line leaves Pittsburgh Sunday nights, but not on Saturday nights.

MAIN LINE--GOING EAST.

	Pittsb'g Expr'ss	Fast Line.	Day Expr'ss.	Accom.
Leave Cleveland	8 25am	2 00pm	11 40pm	3 45pm
Arrive Hudson	9 32	3 00	12 50am	4 50
Ravenna	10 06	3 23	1 20	5 23
Alliance	10 49	3 58	2 00	6 00
Bayard	11 20	4 27	2 50	.....
Salineville	12 10pm	5 10	3 40	Leave.
Wellsville	12 50	5 49	4 35	8 00ALI
E.Liverpool	1 20	6 05	4 57	8 11
Beaver	1 59	6 40	5 47	8 54
Rochester	2 05	6 45	5 52	9 00
Allegheny	2 55	7 35	6 45am	9 50
Pittsburgh	3 05	7 45	6 55	10 00am
Harrisburg	.....	4 15am	4 00pm	.....
Baltimore	.....	7 45	7 20	.....
Washington	.....	9 15	8 47	.....
Phila	.....	7 50	7 35	.....
New York	.....	11 15	10 35	.....
Boston	.....	8 00pm	.....	.....

Accommodat'on train leaves Cleveland Union Depot at 5:30 p. m., arrives at Hudson at 6:53 p. m., Ravenna 7:20 p. m.

All trains connect at Yellow Creek for Wheeling and Bellaire.

☞ Fast Line runs through Sleeper to New York Day Express runs through Sleeper to Pittsburgh.

WM. A. BALDWIN, Manager, E. A. FORD, Gen. Pass. & Tkt Agt. Pittsburgh.

C. L. Kimball, District Passenger Agent, corner Bank and St. Clair sts., Cleveland.

Blue Grass Route of Ohio

TIME TABLE.

The Cleveland, Mt. Vernon and Delaware RAILROAD.

GEO. D. WALKER, RECEIVER.

SOUTH-BOUND TRAINS

	Mail.	Expr'ss.	Acc'm	Acc'm
Leave. Cleveland	8 25 am	2 00 pm	3 45pm	.....
Hudson	9 40	3 10	5 00	.....
Cuyahoga F's.	9 57	3 27	5 20	.....
Akron	10 12	3 42	5 47	.....
Clinton	10 42	4 14	6 19	.....
Warwick	10 47	4 19	6 25	.....
Orrville	11 14	4 45	6 51	.....
Fredricksburg	11 45	5 17	7 23	.....
*Holmesville	11 55	5 27	7 33	.....
Millersburg	12 08	5 40	7 45	5 35
*Killbuck	12 22 pm	5 54	.....	5 49
Gann	1 00	6 53 S	.....	6 49 B
Danville	1 11	7 04	.....	7 01
Gambier	1 31	7 24	.....	7 21
Mt. Vernon	1 45	7 38	.....	7 34
*Mt. Liberty	2 07	8 00	.....	7 53
Centerburg	2 19	8 12	.....	8 05
*Condit	2 33	8 26	.....	8 19
*Sunbury	2 43	8 36	.....	8 29
Westerville	2 05	8 59	.....	8 52
Columbus	3 30	9 25	.....	9 20
Cincinnati	8 00	.....	.....	.....

NORTH-BOUND TRAINS.

STATIONS.	Expr'ss.	Mail.	Acc'm	Acc'm
Leave Cincinnati	.....	8 00 am	.....	.....
Columbus	7 20 am	12 25 pm	.....	5 15 pm
Westerville	7 45	12 50	.....	5 43
*Sunbury	8 08	1 11	.....	6 06
*Condit	8 19	1 21	.....	6 17
Centerburg	8 33	1 35	.....	6 31
*Mt. Liberty	8 45	1 47	.....	6 44
Mt. Vernon	9 11	2 12	.....	7 08
Gambier	9 24	2 25	.....	7 24
Danville	9 44	2 45	.....	7 44
Gann	9 57	2 57	.....	7 56
*Killbuck	10 35	3 35	.....	8 32
Millersburg	10 51	3 50	5 45am	8 45
*Holmesv'e	11 04	4 03	5 58	.....
Fredricksb'g	11 15	4 12	6 08	.....
Orrville	11 50	4 45	7 10 B	.....
Warwick	12 14	5 10	7 37	.....
Clinton	12 19	5 15	7 46	.....
Akron	12 50 pm	5 47	8 20	.....
C'yahoga F's	1 02	6 01	8 33	.....
Hudson	1 20	6 20	8 53	.....
Ar. Clevel'd	2 30	7 30	10 10	.....

* Stop on signal. B Breakfast. S Supper.

N. MONSARRAT, Gen'l Supt., Akron, O. E. T. AFFLECK, General Passenger Ag't, Columbus, O.

Cleveland to New York,

VIA THE

NEW YORK, PENNSYLVANIA AND OHIO RAILROAD.

[Formerly Atlantic & Great Western Railroad]

For New York, Boston and the East. The shortest and quickest route to Pittsburgh, Washington, Baltimore and the Southeast.

Until further notice trains will leave the new Central Depot, South Water Street and Viaduct, as follows:

7:10A.M. LIGHTNING EXPRESS (daily) sleeping and hotel coaches from Leavittsburg. 8:55 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m., (dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p. m.; Buffalo, 6:15 p. m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p. m., (supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m.; Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

11:05 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsburg to New York without change. Arrives at Youngstown, 1:45 a.m.; Pittsburgh, 6:15 a. m.; Washington 9:15 a. m.; Baltimore 10:34 p. m.; Meadville, 3:50 a. m.; Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a. m.; Rochester, 1:10 p. m.; Hornellsville 1:20 a. m.; Corning, 12:53 p. m.; Elmira 1:21 p. m.; Binghampton, 2:50 p.m.; New York 9:25 p.m.

2:30 P.M. PITTSBURGH EXPRESS, daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 7:48 p.m.; Washington, 7:30 a.m.; Baltimore, 8:19 a.m.; via Sharon to Meadville, arriving 7:35 p. m.

4:25 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:25 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p. m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 10:48 p. m.

7:10 A.M. PITTSBURGH EXPRESS, —(daily) through without change. Arrives at Youngstown, 9:50 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a m.; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:33 a.m., and 1:13 p. m. and 4:20 p.m.

11:00 A.M. YOUNGSTOWN & PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 1:50 p m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:50 a.m., 7:00 p. m., 10:55 a. m 2:00 p.m., and 10:15 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

Baggage Checked Through to All Points East

☞ Through Tickets and information regarding the route can be obtained at the Union Ticket Office, corner Bank and Superior streets; at office 131 Bank street, and at new Depot of New York, Pennsylvania and Ohio Railway, South Water street and Viaduct, Cleveland.

A. E. CLARK, Gen. Pass'r. Agt., Cleveland, Ohio.
M. L. FOUTS, Pass. Agt. 131 Bank st., Cleveland.
J. M. FERRIS, Gen. Man'gr. Cleveland

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This Company makes a new departure in its day coaches which the traveling public will undoubtedly appreciate. Each coach has a marble top wash stand with soap and towels, thus furnishing free what has hitherto been the luxury of the drawing-room car. The windows are wide and nigh, giving a splendid view of the country. The large paper car wheels, 42 inches in diameter, make the coaches ride so smoothly and noiselessly that conversation is carried on as easily as in a parlor The smoking cars have rattan seats, making them much cleaner and more pleasant than the old style. All the coaches are new and of latest design.

GOING EAST.

	Local Pass'n'gr	Local Pass'ngr	Con'eaut Accom.
Leave Chicago	8 10 am	.....	.....
So. Chicago	9 53	.....	.....
Valparaiso	10 08	.....	.....
Ar. Ft. Wayne	1 50 pm	.....	.....
Ft. Wayne	2 10	.....	.....
New Haven	2 25	.....	.....
West Leipsic	4 29	.....	.....
Arcadia	5 30	.....	.....
Fostoria	5 45	.....	.....
Green Springs	6 32	.....	.....
Bellevue	7 10	6 45 am	.....
Vermillion	8 16	7 42	.....
Lorain	8 41	8 07	.....
Ar Cleveland	10 00 pm	9 18	.....
Lv Cleveland	.....	9 23	4 30 pm
Euclid Ave	.....	9 40	4 47
Mentor	.....	10 20	5 27
Painesville	.....	10 35	5 40
Ashtabula	.....	11 34	6 37
Conneaut	.....	12 05 pm	7 05
Erie	.....	1 18	.....
Dunkirk	.....	3 05	.....
Ar. Buffalo	.....	4 50	.....

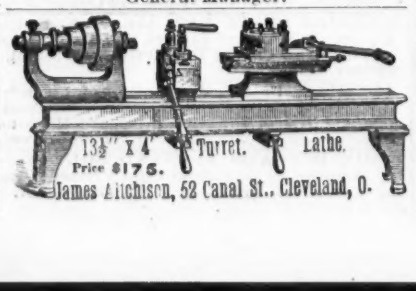
GOING WEST.

	Local Passn'gr.	Local Pass'ng r.	Con'eaut Accom.
Leave Buffalo	8 00 am	.....	.....
Dunkirk	9 53	.....	.....
Erie	11 46	.....	.....
Conneaut	12 55 pm	.....	6 30 am
Ashtabula	1 27	.....	7 00
Painesville	2 28	.....	7 55
Mentor	2 43	.....	8 08
Euclid Ave.	3 26	.....	8 48
Ar Cleveland	3 43	.....	9 05
Lv Cleveland	3 48	6 55 am	.....
Lorain	4 58	8 07	.....
Vermillion	5 20	8 30	.....
Bellevue	6 15	9 40	.....
Green Springs	.....	10 15	.....
Fostoria	.....	11 00	.....
Arcadia	.....	11 15	.....
West Leipsic	.....	12 18 pm	.....
New Haven	.....	2 25	.....
Ar Ft Wayne	.....	2 45	.....
Lv Ft Wayne	.....	3 05	.....
Valparaiso	.....	6 58	.....
So Chicago	.....	8 24	.....
Chicago	.....	9 00	.....

Trains run by Columbus time.

For rates or information, call on nearest Agent of the Company or address

HENRY MONETT, Gen'l Passenger Agent, Hoyt Block, cor. St. Clair and Bank streets, Cleveland, O.
LEWIS WILLIAMS, General Manager.



James Aitchison, 52 Canal St., Cleveland, O.

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Three Trains Week Days, TWO TRAINS SUNDAY.

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This is the only line making Direct Connection with all the principal Trunk Lines of the East for all Southern, Southwestern and Western points, either by way of Cincinnati, Indianapolis or St. Louis for all railway towns in Missouri, Arkansas, Texas, Kansas, Nebraska, Colorado, New Mexico, Old Mexico and the Pacific Coast.

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A. J. Smith, Gen'l Pass. Agent, CLEVELAND, O.

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Vulcan Iron Works Company,

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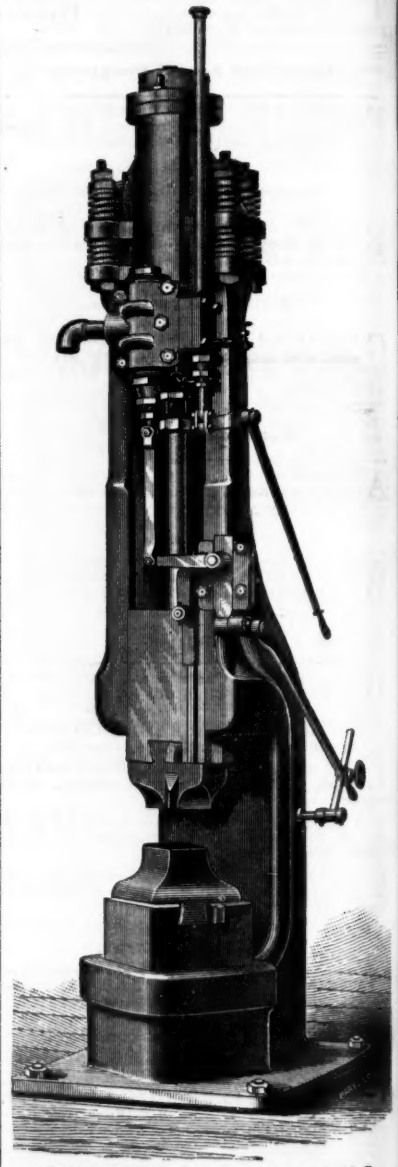

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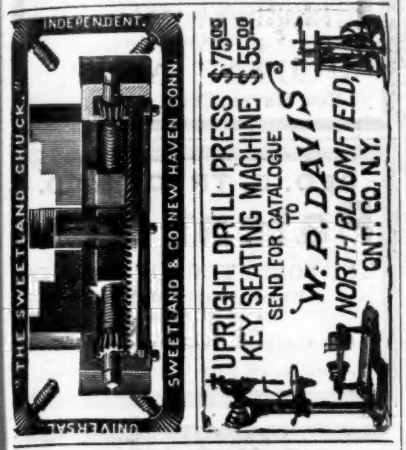

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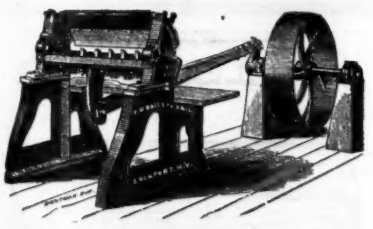

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Also, Second-Hand Machines of All Kinds.

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GOLD, SILVER, AND BRONZE MEDALS FOR SUPERIOR MERIT.

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Wm. S. Eaton, National Tube Works Co., etc., Boston.
Wm. Chisholm, President Cleveland Rolling Mill Co., etc., Cleveland.
Thomas M. Carnegie, President Edgar Thomas Steel Co., etc., Pittsburgh.
W. H Doan, Pres. J. A. Fay & Co., Wood Working Machinery, Cincinnati.
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E. H. Talbott, President and Manager "The Railway Age," Chicago.

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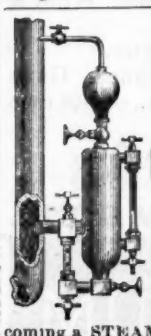

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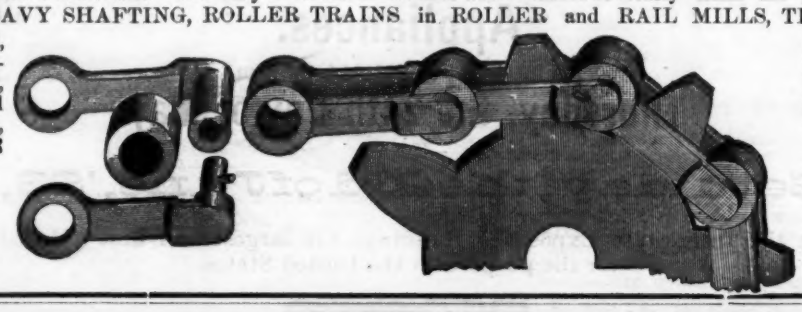

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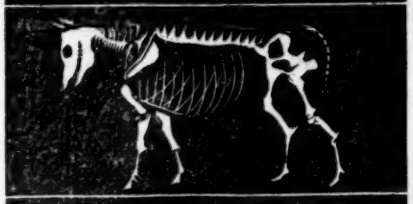

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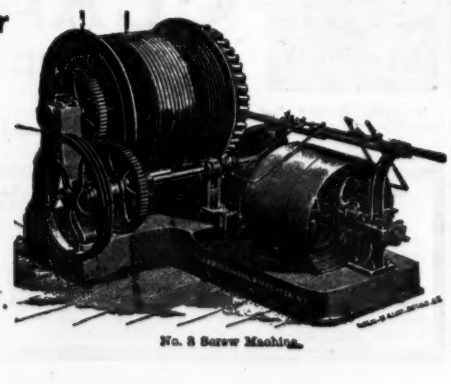

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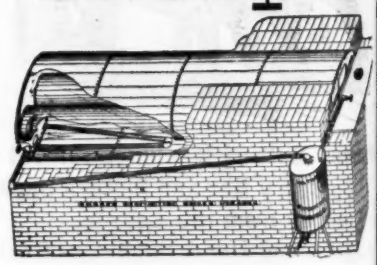

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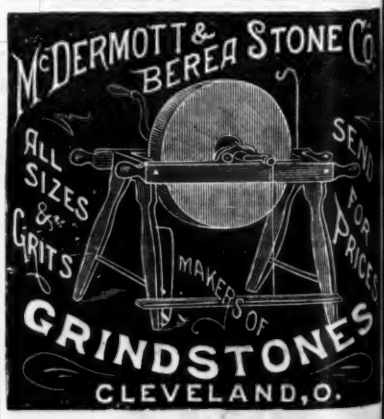

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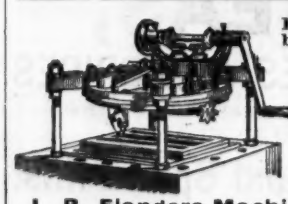

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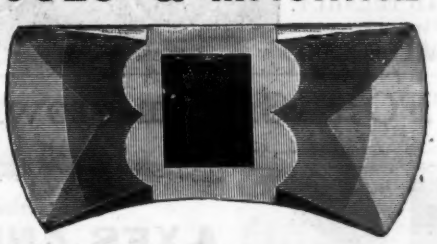

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III. Special Articles. Under this head the REVIEW is taking up and presenting to its readers the fullest and most reliable data as to the extensive interests concentrated at Cleveland, such as ore, copper, iron and steel, etc., and manufacturers throughout this section who buy so largely of the raw material in Cleveland will find these facts of invaluable service to them.

IV. Contributed Articles. As an earnest of what the REVIEW is arranging for in this direction, attention is called to the very interesting and important articles in the issue of December 23, by John H. Sargent, civil engineer, of Cleveland, and Jacob Reese, metallurgist, of Pittsburgh. Arrangements have also been made for a series of articles by practical machinists and mechanics.

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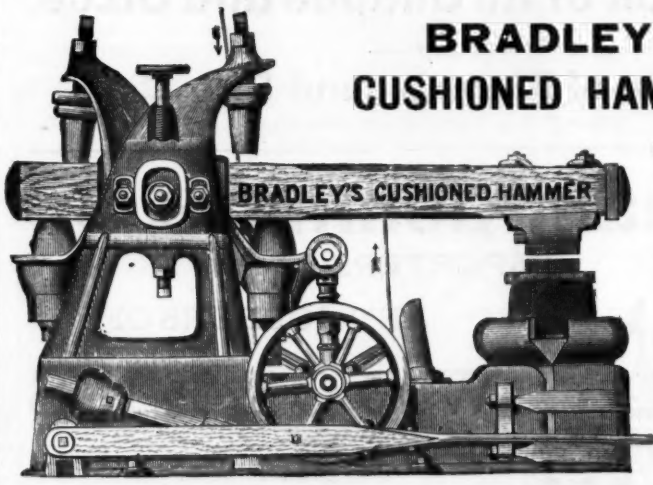

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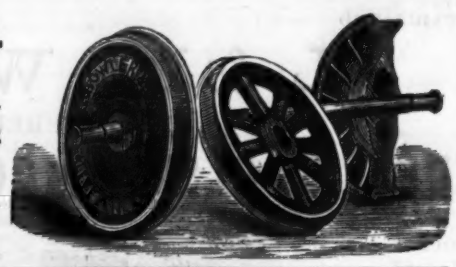

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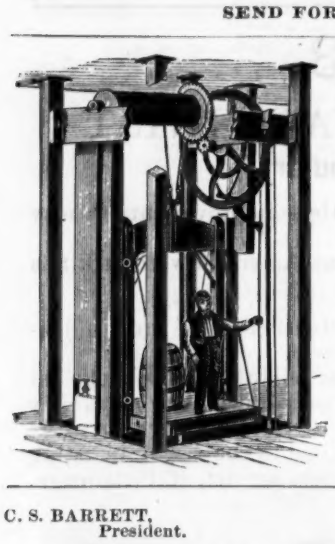

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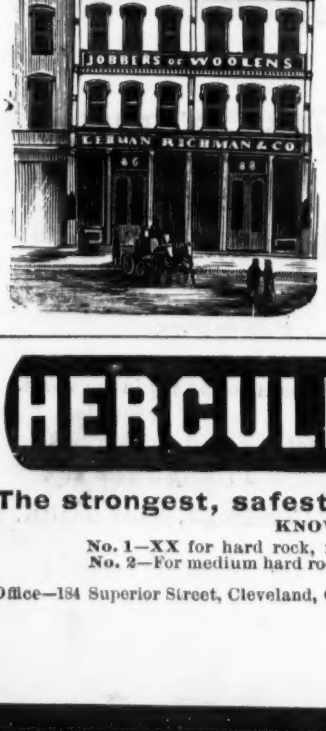

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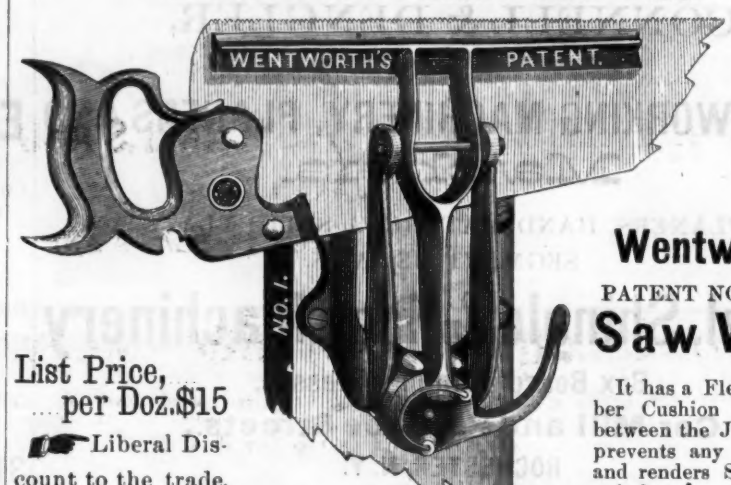

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